



FRIDAY, JULY 7, 1899.

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Contributions.

Improvement of the Grand Central Station.

To the Editor of the Railroad Gazette:

It seems to one partially acquainted with the facts that the Railroad Gazette of June 23 did an injustice in stating that "this plan is now to be carried out on designs made by S. Huckel, Jr., of Philadelphia." Professional credit is a serious matter. It is the engineer's and the architect's capital stock, and its value is more susceptible to injury by careless or inaccurate statements in a journal of the Railroad Gazette's standing than is the stock of a corporation. In such a case the professional man is almost defenseless unless another, who is in no way associated with him, develops the truth.

It needs no more than your own records to show that Mr. S. Huckel, Jr., did not design the Grand Central Station improvements. In the Railroad Gazette, February 19, 1897, Mr. Bradford L. Gilbert's plans for this work were shown. A comparison of these drawings with those now credited by you to Mr. Huckel shows that no essential change has been made in Mr. Gilbert's solution of a most difficult problem of providing suitable union waiting rooms for passengers, and handling baggage without purchasing additional space at this great terminal. Moreover, Mr. Gilbert's plans, as revised and submitted to engineers and contractors for purposes of estimate in May, 1897, were somewhat changed from those which you published and made to conform still more nearly to those now claimed for Mr. Huckel. I have now before me a sketch of those revised plans, with changed location of ticket offices, etc., as I saw them in 1897, and Mr. Huckel's variations from them are not significant. The salient points in the solution of the problem are identical, viz.: the location of the union waiting room; the provision for handling outgoing baggage; the location of the ticket offices, and the plan for rebuilding without interference with traffic. The substitution of the flat roof for the arch was Mr. Gilbert's alternative suggestion.

Mr. Gilbert designed and had charge of building the office structure which surmounts the proposed waiting room. The contractors presented a bill for extras which Mr. Gilbert refused to approve, claiming that the items were covered by the specifications and contract. These contractors appear to have been paid a part at least of the "extras" and secured the contract for the waiting room, and Mr. Gilbert was relieved from the superintendence of their work, although his plans were accepted and paid for, and are now being carried out with only minor changes.

This case strikes me, as doubtless it will other engineers and architects, as being apparently an instance of the triumph of the contractor over the professional man.

C. E.

Solid Brake Beams.

To the Editor of the Railroad Gazette:

Referring to your friendly discussion of my paper and Mr. W. K. Hatt's letter on the same subject, in your issue of June 9, permit me to add the following remarks:

Threaded tension rods and booms with holes are naturally unobjectionable when subjected only to a steady load. Shocks, however, find out such weak points and rack all fastenings generally with surprising rapidity, and shock is essentially the service condition of a brakebeam. Therefore, the fewer pieces the better, even at increased cost.

A knowledge of the conditions of design is necessary for a correct comparison of weights. The tension members of my beams are strained to about 10,500 lbs. per square inch under working load. The section of boom is determined solely with reference to buckling strength, the coefficient of safety against buckling varying from  $3\frac{1}{2}$  to 4. Obviously a built up beam designed under the same conditions will, in all but exceptional cases, be heavier than a solid one, and less secure.

Forging, is of course, much cheaper in Europe than in the United States, whence the preference for solid beams in the former and built up ones in the latter continent. I have been accustomed to make these 55 mm. (2.17 in.) in diameter and 100 mm. (3.94 in.) long, pinhole for  $\frac{1}{2}$  in. pin drilled 20 mm. (0.79 in.) from end. These proportions (which are much the same as those of the M. C. B. Association) give ample wearing surface and have proved worth their cost.

R. H. ANGLIER.

Easton, Pa., June 30, 1899.

To the Editor of the Railroad Gazette:

I read with interest the article in your paper by R. H. Angier on "Solid Brake Beams," and replies of later date.

In regard to solid brake beams of American make as compared with those of European, I think that those that have proved satisfactory on American roads will certainly be strong enough on European roads, with their small capacity cars.

You can certainly make a forged wrought iron beam that will be more economical in weight and still be stronger than a beam made of rolled section, but the question is, will it pay to do so? If it did, the American engineers would certainly have discovered the fact, and a forged beam would have been in the market long ago. Most any engineer knows how to make a first class design if the cost does not need to be considered. Not so many know how to make a design that will answer the purpose and can be manufactured cheaply.

As to the steel beams of different makes in this country, the built up beams are certainly out-classed by the beams made of rolled sections, which is proved by the fact that they are now being rapidly replaced by rolled beams. But in selecting a rolled section there are a good many points to be considered; not only to obtain the most economical for strength and weight, but also to get a shape that will easily be applied to the different styles of truck, and the most economical shape for static load would probably not be the best for a brake beam where the load is suddenly applied and strained in different directions. Take, for instance, an I beam with thin web and wide and thin flanges, which shape of beam could be made quite light in comparison to its strength for static load, but how would this beam behave under a car in rough service? The slightest blow on the flange will bring same out of line, and once in such shape, how can it resist either compression or tension? The deck beam shape, I think, has so far proved to be the best out among rolled steel beams, both for its shape, allowing it to be applied in many tight places, and for not being flimsy in design, being able to stand considerable roughing without changing its shape, and consequently keeps its original strength.

K. DINGERTZ, M. E.

Heat Tests of Car Wheels.

To the Editor of the Railroad Gazette:

Permit me the use of your columns to point out two errors in the very interesting report on "Thermal Tests of Car Wheels" published in your issue of June 7, 1899, and also to express a doubt as to the correctness of computing the "factor of safety" by the method adopted.

The first error is that the table giving the results of the second series of tests (middle column, p. 400) gives tin as melting at the 3 in. point, when it should be at the 2 in. point.

The second error referred to seems to have been made in the original report, as in the reprint to which I have access Prof. Smart is quoted as follows: "In comparing any two similar tests, the relative severity is taken to be the product of the ratio of the maximum temperatures and the ratio of the time required to reach that temperature." Then follow figures comparing the braking test and the modified thermal test, which are the same as you give near the bottom of the first column on page 401 of your issue of June 7. These figures are:

Ratio of maximum temperatures,  $440 : 240 = 1.83 : 1$ .  
Ratio of time in reaching maximum temperature,  $3.56 : 20.5 = 1 : 5.75$ .

By reference to the table on page 400 of that issue, which gives the data for the modified thermal test (series 3) it will be seen that 3.56 minutes is the time

in which a point 3 in. from the tread of wheel No. 311,367 reached  $240^{\circ}$  F., and not the time of reaching the maximum of  $440^{\circ}$  F. This latter time is given as 16.4 minutes (mean of 17 min. 40 sec. and 14 min. 45 sec.).

From the numerical computation it is evident that the "relative severity" is taken to be the product of the ratio of the maximum temperatures and the ratio of the times required to reach the lower of the two maxima. In the absence of the reasons which led to the adoption of this measure of relative severity it is not readily apparent that the maximum temperature in degrees Fahrenheit divided by the time in minutes required to reach  $240^{\circ}$  F. has any physical significance which makes it a proper measure.

It does not seem to me to be at all correct to use the ratio of maximum temperatures as has been done, for the reason that this is an arbitrary scale. Had the experimenters used Centigrade thermometers the temperatures would have been  $115^{\circ}$  C. and  $176^{\circ}$  C. instead of  $240^{\circ}$  F. and  $350^{\circ}$  F. for comparing the braking tests and the Pennsylvania thermal test; this gives 1.53 for the ratio of the maxima as against 1.46 given in the report. For comparing the braking test with the modified thermal test the temperatures would be  $115^{\circ}$  C. and  $227^{\circ}$  C., instead of  $240^{\circ}$  F. and  $440^{\circ}$  F., giving a ratio of maxima of 1.97 instead of 1.83. Were the absolute temperature scale adopted the ratios would manifestly be entirely different.

If a car wheel cracks when the tread is heated it is because of the stresses due to the expansion of the heated portion while the interior of the wheel is cold. Other things being equal, the expansion is proportional to the rise in temperature, hence the difference in temperatures is a measure of the severity of the test. Treatises on steam boilers usually give the quantity of heat conducted through a plate as proportional to the difference in temperatures on the two sides, and add that Rankine found that the flow of heat was more nearly proportional to the square of the difference in temperature when the difference is great.

Now, in comparing the braking test with the Pennsylvania thermal test the time required to heat a point 3 in. from the tread to  $240^{\circ}$  F. is so widely different in the two cases that it suggests itself to me that probably Rankine's formula should be applied in the Pennsylvania test in trying to estimate the difference in temperature between the tread and the 3 in. point. The initial difference in temperature between molten iron and the car wheel is certainly as great as that between the gases and water in the case of a boiler.

Assuming Rankine's law to hold for these experiments, the difference in temperature between the tread and the 3 in. point for the braking and the Pennsylvania tests would be represented by the ratio

$$\sqrt{1.4} : \sqrt{20.5} = 1 : 3.83,$$

which I think is better than the ratio  $1.4 : 20.5 = 1 : 14.64$ .

To thus compare the braking test with the modified thermal test, the ratio would be

$$\sqrt{3.56} : \sqrt{20.50} = 1 : 2.4$$

instead of  $3.56 : 20.50 = 1 : 5.75$ .

No rational method of combining with these results the fact that the maximum temperatures were different in the two cases occurs to me, nor is it quite evident that they should be combined. An examination of the tables of results on p. 400 of your issue of June 7 shows:

In series 2 (Pennsylvania thermal tests), sulphur ( $240^{\circ}$  F.) melted 3 in. from the tread at point A in 1 min. 24 sec.; solder ( $350^{\circ}$  F.) melted 3 in. from the tread in 4 min. 30 sec.; tin ( $440^{\circ}$  F.) melted 2 in. from the tread in 3 min. 15 sec. From this we may conclude that the maximum difference in temperature between points 2 in. and 3 in. from the tread (at A) was more than  $90^{\circ}$  F. and less than  $200^{\circ}$  F.; probably, considering the time intervals, not far from  $130^{\circ}$  F. Similar reasoning makes the probable maximum differences at B, C and D (see Fig. 2, p. 400) about  $170^{\circ}$  F.

In series 3 (modified thermal tests) sulphur ( $240^{\circ}$  F.) melted at 3 in. in 3.56 minutes; solder melted at 2 in. in 4.1 minutes. Whence the difference in temperatures was less than  $110^{\circ}$ , probably not far from  $100^{\circ}$  F. Also, solder melted at 3 in. in 6 min. 20 sec., while tin melted at 2 in. in 6 min. 45 sec.; a difference of about  $90^{\circ}$  F.

From this it may be argued that though the maximum temperature 3 in. from the tread was higher in series 3, yet the stresses due to difference in temperatures were less, and I would place the "relative severity" at

$$[(130+3 \times 170) \div 4] : 100 = 1.6 : 1,$$

the Pennsylvania thermal test being the more severe.

As a coincidence it may be noted that when the two thermal tests are compared by taking the square roots of the times required to heat the 3 in. point to  $240^{\circ}$  F., the relative severity is as

$$\sqrt{3.56} : \sqrt{1.4} = 1.6 : 1.$$

This discussion is not offered with the idea of disparaging the work done by Profs. Goss and Smart and the Griffin Co., but merely as a protest against the "factor of safety" in thermal tests as the pro-



duct of two ratios, one of times and one of temperatures, measured above an arbitrary zero point. X.

### The Convention of the American Society of Civil Engineers.

The thirty-first annual convention of the American Society of Civil Engineers was held last week, according to the programme which has already been published. The list of those enrolled at Cape May, being members and their guests, includes 583 names. These are the names on the printed list of people who actually appeared at the convention, and probably is not far from the total of those who were there. This, we believe, is the greatest number that ever attended one of the conventions of the Society. The weather was fine and the work of the committees was well done and everything went as planned, to the great comfort and enjoyment of those who attended. This statement should be qualified a little by adding that the number of people arriving at once on Monday night was quite too large to be promptly and smoothly handled, except by people who had some talent for organization, and it was apparent that the hotel people were not largely gifted that way. The result was a good deal of discomfort that night and a good deal of complaint, but otherwise everything went off smoothly.

As we have already published the programme of the meeting, we shall not repeat it. The President's address was delivered at 10 o'clock Tuesday morning. Extracts from this appeared in our issue of June 30, page 471.

In the evening Colonel Raymond, Corps of Engineers, U. S. A., Member of the Society, delivered an address on "Breakwater Construction," illustrated by lantern slides. He explained the early theories formulated largely by French engineers, as to the correct theoretical cross sections of breakwaters, and then showed how these sections had been modified by practice until the much more economical and apparently equally efficient section of the Delaware breakwater was arrived at.

The session of Wednesday morning, which was given to the discussion of question of the disposal of sewage, particularly with reference to the contamination of streams, was opened by Mr. Robert E. McMath, of St. Louis. Mr. McMath presented the subject with singular clearness and order and we hope to publish his short paper in an early issue of the Railroad Gazette. He was followed by half a dozen members in speeches or papers of more or less merit.

Thursday was devoted to an excursion to Atlantic City, on which a considerable number of the members and their guests went, but enough wise people were left behind at Cape May to keep each other from being dull.

On Friday morning the session was opened with a short paper by Mr. T. Guilford Smith, of Buffalo, describing the Gruson cast-iron turret, the rights to make and sell which in America have been acquired by an American company recently organized. This was followed by a discussion on the economical conditions under which electricity may be substituted for steam in the operation of branch lines. The discussion was opened by Colonel H. S. Haines and half a dozen speakers took part in it, more or less to the profit of the members of the Society.

On Saturday the party left Cape May for Philadelphia by a special train and visits were made to Cramp's shipyards, to the Reading Terminal Station and the Pennsylvania Broad Street Station, at both of which lunch was served; to Fairmount Park and some of the most important features of the City Water Works, to Gray's Ferry Bridge and Delaware avenue improvement and to other places of interest. The Pennsylvania Railroad Company and the Philadelphia & Reading Railroad were most liberal in providing special trains to take the members and their guests to and from Cape May and for the various excursions.

#### Nominating Committee.

At the business meeting the following members of the Nominating Committee were elected to serve for two years:

District No. 1, A. W. Trotter, 71 Broadway, New York.  
District No. 2, George B. Francis, Resident Engineer, Boston Terminal Co., South Terminal Station, Boston, Mass.

District No. 3, T. McC. Leutze, First Assistant Engineer New York State Canals, 11 Pine Avenue, Albany, N. Y.

District No. 4, W. G. Wilkins, Consulting Engineer, Westinghouse Building, Pittsburgh, Pa.

District No. 5, Augustus Mordecai, Assistant Chief Engineer Erie R. R., Garfield Building, Cleveland, O.

District No. 6, J. A. Ockerson, Consulting Engineer, Member Mississippi River Commission, 2732 Pine St., St. Louis, Mo.

District No. 7, H. N. Savage, Engineer in Charge Sweetwater Dam, National City, Cal.

The members of the Nominating Committee who hold over from last year are five past Presidents, namely:

William Metcalf, Pittsburgh, Pa.; Gen. William P. Craighill, Charlestown, W. Va.; George S. Morison, Mills Building, New York City; T. C. Clarke, 127 Duane St.,

New York City, and Benjamin Harrod, City Hall, New Orleans, La.; also,

District No. 1, H. G. Prout, 32 Park Place, New York City.

District No. 2, J. W. Ellis, Woonsocket, R. I.

District No. 3, Emil Kuhlbeling, Chief Engineer Rochester Water Works, City Hall, Rochester, N. Y.

District No. 4, L. M. Haupt, Consulting Engineer, 107 North 35th St., Philadelphia, Pa.

District No. 5, I. O. Baker, Professor of Civil Engineering, University of Illinois, Champaign, Ill.

District No. 6, N. W. Eayrs, Supt. Structure, etc., Terminal Railroad Association, St. Louis, Mo.

District No. 7, Andrew Rosewater, Consulting Engineer, Bee Building, Omaha, Neb.

The officers to be elected are the President, a Vice-President from District No. 1 and a Vice-President who may be taken from any district, a Treasurer from District No. 1, and six Directors, these to represent, we believe, Districts No. 1, 4, 6 and 7. We would suggest that those who have candidates to suggest should indicate their preferences to members of the Nominating Committee pretty promptly.

#### Other Business.

At the business session Mr. Whinery presented a resolution to the effect that the Chief of the Twelfth Census should be urged to make arrangements to collect statistics of municipal works and that the Board of Direction should take the necessary steps to confer and advise with him. This resolution was carried.

Mr. Seaman introduced a resolution to the effect that the Society should pay the traveling expenses of members of the Nominating Committee, his argument being that for many such members coming from long distances the burden of service was very heavy. This matter was referred to the Board of Direction with a suggestion that the Board consider the advisability of any changes in the method of procedure of the Nominating Committee.

#### Accounting Officers' Annual Meeting.

The eleventh annual convention of the Association of American Railway Accounting Officers was held at Montreal, June 28, President P. A. Hewitt (C. C. & St. L.) in the chair. Mayor Raymond Prefontaine of Montreal made an address of welcome.

The President responded and after roll call delivered his annual address. He said, in part:

It may be safely averred that no association of men, having for their aim the development of mutual business interests, has ever accomplished more than has our Association; this, by intelligent, conscientious and persistent work, assisted not a little by the friendship developed by our social intercourse. Yet there is much before us to be done. The strength and efficacy of our Association rests in a great measure upon the fact that a large proportion of its membership is employed on committee work. You have your Executive Committee, your Standing Freight Committee, your Standing Passenger Committee, your Standing Committee on Disbursements, your Standing Committee on Car Accounts and Miscellaneous Revenue Accounts. Then there are your special Committee on Nomenclature, on Train and Locomotive Mileage, on Cipher Code, on Government Transportation Settlements and your Conference Committee with the Interstate and State Railroad Commissioners on Uniform Statistics. Your organization would appear to be more nearly perfect at this time than at any time in the past, and it would not seem to be wise to consider any measure looking to the curtailment of your committees in the scope of their work, or in seeking to reduce the number of their meetings or the time employed. This must be apparent from the character of the work accomplished during this year. You who have served on these committees can best appreciate the unwritten work entailed, out of which the reports of your committees have been perfected.

It is gratifying to note the close and pleasant relations existing between your Association and the Interstate Commerce Commission and the State Railroad Commissioners of the United States; your Executive Committee having, by invitation, at its last meeting had the pleasure of a joint conference with Prof. H. C. Adams, Statistician Interstate Commerce Commission, upon several questions of mutual importance, looking to more intelligent and uniform statistics, and it may be safely predicted that the special committee to confer with the Railroad Commissioners on Uniform Railway Statistics, raised by your Executive Committee, will have accomplished much good.

The fast freight lines operating over the New York Central and certain of its affiliated lines have established a Clearing House at Buffalo, to clear the earnings of the roads interested, way-billing their freight through over these roads without division of revenue on the way-bills, doing away with expensive junction settlements. The General Manager of the Clearing House has been an active member of our Association, having acted for years as a member of our Standing Freight Committee, and for six years its Chairman.

Our membership is 345, representing 170,545 miles, or about ninety per cent. of all the railroad mileage in America, and is the largest in the history of our organization. In addition to the railroad mileage represented in our Association, we have the American, Southern and Adams Express Companies, the Pullman and Wagner Palace Car Companies and numerous private car lines, and the recently organized Buffalo Railway Clearing House. Among the fast freight lines we have the Star Union Line, the Blue Line, Canada Southern Line and Hoosac Tunnel Line. Among the Steamboat interests are such lines as the Baltimore, Chesapeake & Richmond Steamboat Co., Erie & Western Transportation Co., Merchants' & Miners' Transportation Co.,

Old Dominion Steamship Co. and Richelieu & Ontario Navigation Co.

My attention has been directed to the lack of an adequate and uniform system for the prompt handling and vouchering of car repair bills. There is needlessly tying up of large amounts of money for indefinite periods, in addition to the carrying of numberless collection vouchers and open unsettled accounts. . . .

We look forward to the time when transportation companies will honor bills of lading as originally made, where there are any differences between the bill of lading and the way-bill, whether the property goes over one or more than one road. Aside from the question of justice to patrons, time and money would be saved to the companies if in all cases the bills of lading were honored; and it would seem quite within the scope and possibilities of this Association to make such recommendation as would bring about this much needed reform.

Looking forward, cannot we have uniformity in the settlement of corrections on all interline billing? Cannot all such corrections be settled through monthly joint freight account and not by over and undercharge vouchers?

At the conclusion of the address, the committee reports were presented and discussed. The various reports considered were: Train Mileage, passenger and freight; lightweighting and stenciling of freight cars from a revenue and accounting standpoint; the making of notations by agents, on original paid freight bills; changes in the Association form of card waybill; uniform dates for closing the weeks in making junction agents' settlements; interline waybill; local clearing houses for settlement of car mileage accounts; standard form of draft; standard method of settlement between companies; draft vouchers; use of M. C. B. defect cards to effect the correction of car repair bills; standard blank for settlement of authorized freight claims by monthly drafts; checking time and payrolls; checking labor accounts; car mileage bureau; and individual mileage method.

The Executive Committee submitted a cipher code for consideration, which was adopted by the Association.

The question of through billing for trans-continental freight received considerable attention, and it was resolved: "That waybilling of freight between Atlantic and Pacific Coast points is practicable and desirable, and that settlement of such waybilling can be made through the accounting department on the association plan. Neither the direction, the distance nor the number of intermediate roads are any hindrance to interline billing on the association plan."

At the second day's session Secretary C. G. Phillips delivered an address on "What the Association Has Accomplished." He said, in part:

Prior to the year 1888 there existed, so far as the accounting departments of the railroads of America were concerned, the widest possible diversity of practice.

In the single matter of rebilling at junctions, the adoption of plans devised and perfected by your Association has saved in cash expenditures many hundreds of thousands of dollars. The advent of through billing required the assent and co-operation of the accountants. Prior to the formation of your Association, the putting into effect of through way-billing over two or more lines was a matter not easily accomplished. Voluminous correspondence had to take place in every instance between the accounting officers of the different roads interested. It is not, I think, sufficiently recognized that in the economy of the railroad operation the blank form plays a most important part. If by the elimination of a useless column, or if by ingenious arrangement of form labor is reduced, time saved, habit of error avoided, or a needed safeguard thrown around revenue or expenditure, the gain is not less substantial than if by some mechanical device the utility of fuel is increased or the energy of motive power conserved.

. . . The interline ticket has been improved; the reporting of interline tickets and excess baggage collections has been systematized; the vexed question of prepaid ticket orders, exchange orders and C. O. D. collections on baggage forwarded have been wrestled with, and order and system have, in a measure, taken the place of the chaos that formerly reigned.

Owing to the existence of your organization it has been possible for the accounting departments of the railroads as a whole to confer with other departments of the railroads as a body; for instance, you have been able to co-operate with the Freight Claim Association, and in conjunction therewith bring about long needed and otherwise unattainable reforms; in this way also the vexed questions of car mileage and methods of computing train and locomotive mileage have been receiving intelligent and concerted attention, which will, without a doubt, bring about beneficial results. When the Interstate Commerce Commission established its bureau of statistics and required of the railroads the rendering of uniform and periodical statistical returns, its officials, without solicitation and with great wisdom and breadth of view, invited the co-operation of the railway accountants of the country in the formulation of such returns.

. . . During the ten years your knowledge and experience have had direct influence with the Commission to the mutual benefit of the nation and the railroads.

The hopes of 1888 have been realized; the prophecies of ten years ago have been fulfilled and success has fitly crowned your labors.

The following members were elected officers for the next term: H. D. Bulkey, Baltimore & Ohio, President; I. G. Ogden, Canadian Pacific, First Vice-President; A. Douglass, St. Louis & San Francisco, Second Vice-President; C. G. Phillips, Chicago (re-elected), Secretary-Treasurer. The place chosen for the next meeting is Boston, and the date is May 30, 1900.



This meeting has been one of the most successful ever held. The Committee on Arrangements provided perfectly for the comfort and entertainment of the members and their families.

The Smith Premier Typewriter Company had an exhibit in a room adjoining the convention hall, and placed machines and operators at the disposal of the members.

#### Atlantic Type Locomotive—Class E-1 No. 698.

This engine has just been turned out of the Pennsylvania Railroad Company's Juniata shops at Altoona, and is one of three for the West Jersey & Seashore Division. It is unusually interesting be-

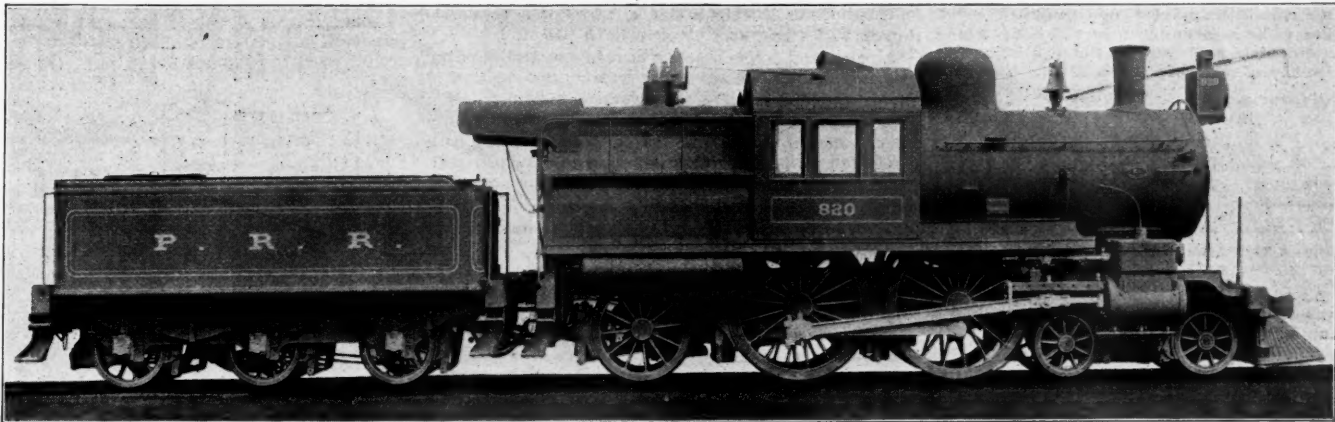
Total wheel base of engine and tender.....	50 ft. 5 in.
Number of wheels in engine truck.....	4
Diameter of wheels in engine truck.....	36 in.
Size of engine truck axle journals.....	5 1/2 x 10 in.
Spread of cylinders.....	20 1/2 in.
Size of cylinders.....	20 1/2 in. x 26 in.
Steam ports.....	1 1/2 in. x 20 in.
Exhaust ports.....	1 1/2 in. x 20 in.
Travel of valve.....	7 in.
Lap of valve.....	1 1/2 in.
Type of boiler.....	Belpaire
Minimum internal diameter of boiler.....	65 1/2 in.
Number of tubes.....	353
Outside diameter of tubes.....	1 1/2 in.
Length of tubes between tube sheets.....	15 1/2 in.
Fire area through tubes, sq. ft.....	4.33
Size of firebox, inside.....	104 in. x 96 in.
Fire grate area, sq. ft.....	69.23
External heating surface of tubes, sq. ft.....	2,102.4
Heating surface of firebox, sq. ft.....	218.0
Total heating surface of boiler, sq. ft.....	2,320.4
Steam pressure per sq. in., pounds.....	185

Mr. John Bell of the Almagamated Society of Railway Servants.

Mr. F. J. S. Hopwood was the first witness. He began by putting in statistics of accidents for the years 1896, 1897 and 1898, which showed totals of 1,433 killed and 11,861 injured, of which 362 were killed and 7,112 injured in shunting operations.

The Board of Trade had no power to enforce its suggestions on the Railway Companies. Its reports were, in fact, no more than pious recommendations, though he had heard Railway Companies speak of them as "impious."

The bill of this session (now withdrawn) was to enable the Board of Trade to make orders on railway companies with regard to various matters such as steam brakes, automatic couplers, brakes capable of being



Atlantic Type Locomotive, Class E-1, No. 698—Pennsylvania Railroad.

cause of the radical departure from the recognized standard type of locomotives built by the Pennsylvania Railroad, and it represents throughout the very best workmanship. For such a big engine, it has remarkably good proportions, giving a good appearance, as will be evident from the accompanying engraving.

The cylinders are 20 1/2 x 26 in., with two pairs of driving wheels 80 in. in diameter with 56-in. trailing wheels under the firebox. The back pair of driving wheels is placed ahead of the firebox.

The firebox is of the modified Wootten type with a combustion chamber. The frames are made of cast steel, as well as the rocker arms and other parts of the locomotive. The eccentric rods are short and connected to the rocker arms with a radius bar. The reach rod is dispensed with as the lift shaft arm is simply extended into the cab and equipped with the standard reach rod attachments.

The valves are set so that a fairly constant lead is maintained up to the fifth notch on the reverse lever quadrant and changes to 1/8 in. plus lead in the 10th notch with a 12-in. cut-off in the cylinders.

The maximum lead (1/4 in.) is obtained with the re-

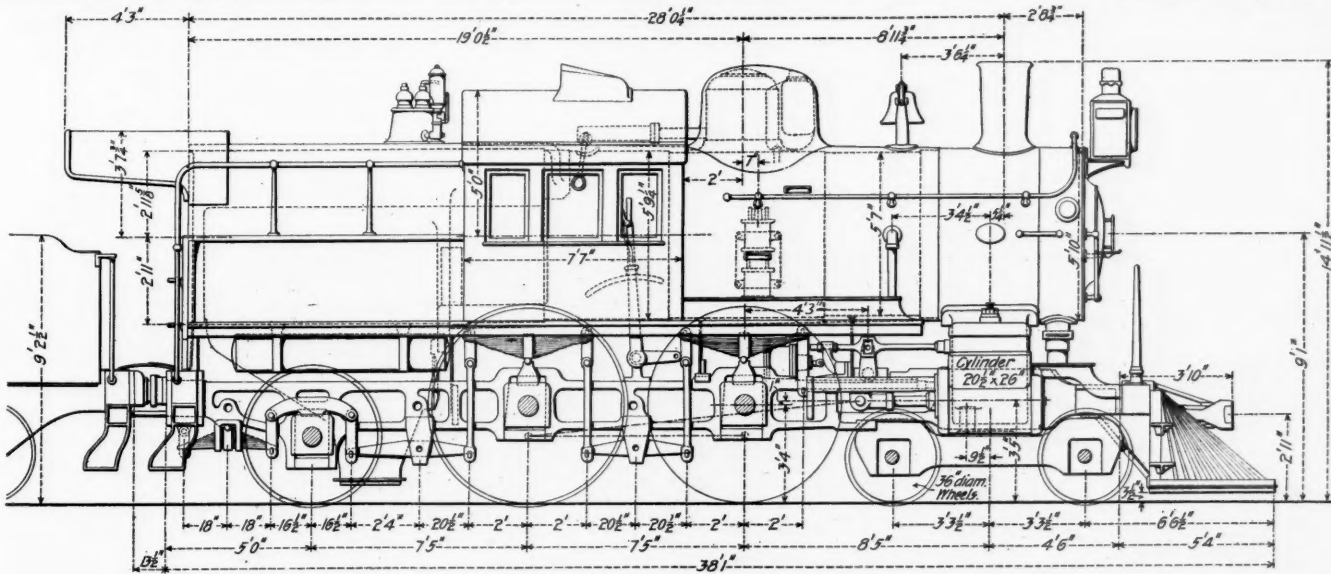
Number of wheels under tender.....	6
Diameter of wheels under tender.....	42 in.
Size of tender truck axle journals.....	5 in. x 9 in.
Weight on truck in working order.....	38,125 lbs.
" " first pair of drivers.....	50,250 "
" " second pair of drivers.....	51,300 "
" " trailing wheels.....	33,775 "
" " engine in working order.....	173,450 "
Traction power per lb. of m. e. p.....	149.0
with m. e. p. equal to 1/2 boiler pressure.....	22,052

This engine had a severe test on June 20 on the New York Division (train No. 46); additional cars were placed in this train, so that the train consisted of ten cars, four of the latest type Pullman cars and six 70,000-lb. coaches, making a total weight of train of 820,000 lbs., or 410 tons, exclusive of the engine.

The train left Broad street station, Philadelphia, at 1 p. m., and ran to Trenton, 33 miles, stopped and left inside of 35 minutes. The total distance from Philadelphia to Jersey City, 90 miles, was covered in 109 minutes, including two stops and reducing speed twice to take water. The engine arrived perfectly cool and the test proved that it was capable of doing considerably better than this.

The engine is intended for the fast service between

used on both sides of the wagon, labels on both sides, and it forbade engines, carriages, or wagons to be used in contravention of any such order. So that although the Board of Trade could not actually make an order on a colliery owner under this bill, the law itself could indirectly prevent any non-complying truck from running on a railway. The Board of Trade had been pressed for some years to deal with the question of automatic couplings, labels on both sides and of a hand-brake which could be applied on either side. In 1893 the Interstate Commerce Commission recommended the adoption of automatic couplers to Congress, who thereupon passed an act ordering that on and after January 1, 1898, freight cars should have continuous brakes, and that automatic couplers—no particular form of which was prescribed—should be adopted by the same date; but an extension of time to January 1, 1900, has been allowed to several companies. The effect of this legislation appeared from the report of the Interstate Commerce Commission, which stated that in July, 1898, out of 1,113,745 cars "reported" 784,596 were fitted with automatic couplings. Sir Charles Scotter here interposed to say that there were 80 different variations in America now. But Mr. Hopwood said 70 per cent. were of the standard Janney type, or as it was now called, the M. C. B. coupler, which implied interchangeability. He admitted that there was not sufficient play in the M. C. B.



The New "Atlantic Type" Engine of the Pennsylvania Railroad—Class E-1, No. 698.

verse lever in the 14th notch, which is hooked up very close, giving a cut-off of 4 1/2 in.

The valve motion is almost a perfect motion so far as the working of the several parts is concerned.

The main rod is made necessarily long on account of being connected to the back pair of driving wheels, and it is made of I-section.

The fire grate area is 69.23 sq. ft., and the total heating surface is 2,320 sq. ft. The tractive power with mean effective pressure, equal to four-fifths boiler pressure, is 22,052 lbs. The following are the leading dimensions:

Number of pairs of driving wheels.....	2
Diameter of driving wheels.....	80 in.
Size of driving axle journals.....	9 1/2 in. and 8 1/2 in. x 13 in.
Length of driving wheel base.....	7 ft. 5 in.
Total wheel base of engine.....	26 ft. 6 1/2 in.

Philadelphia and Atlantic City, and great speeds are expected when it is turned over to this service.

#### The British Coupler Commission.

The first regular sitting of the Royal Commission on Accidents to Railway Servants was held June 16, Lord James of Hereford being in the chair. The other Commissioners present were: Viscount Hampden, Sir Ernest Paget, Sir Charles Scotter, Sir John Wolfe Barry, the Hon. Edward Fellowes, M. P.; Sir Alfred Hickman, M. P.; Sir G. L. Molesworth, Major-General Hutchinson, R. E., C. B.; Mr. H. H. Cunynghame, Mr. W. M. Acworth, Professor Elliott, Mr. John Ellis, M. P.; Mr. Charles Fenwick, M. P., and Mr. Walter Hudson. Mr. Ivatt, Mr. Ellis and the other members of the railroad deputation to America were in attendance, as was also

coupler to enable a truck with rigid wheels to go round very sharp curves.

As to the effect of the 1893 legislation in America, Mr. Moseley, secretary of the Interstate Commerce Commission, reported 219 less killed and 4,944 less injured in 1897 than in 1893. After some discussion, in which Sir Charles Scotter, Sir Alfred Hickman and Sir John Wolfe Barry took a leading part, the Commissioners came to the conclusion that these figures as they stood were not of much value for the purposes of the present inquiry, and Mr. Hopwood said he hoped to have more exact information from America shortly.

Speaking of the adaptability of the M. C. B. coupler to English stock, Mr. Hopwood said it was more really applicable to the old form of American coupler, which was a central coupler by means of a link and pin, and therefore could not be so readily applicable to the English system of the hook and chain; but if modified he





The car service regulations were not intended to apply as between railroads constituting parts of a through line. Railroads do not settle between themselves on that basis. Fifteen cents per day is the amount proposed under the per-diem regulations as covering the ordinary interchange of cars. Why should the charge for "errors" be so much greater? I do not like the expression "Charging for the errors of employees of other roads." Delivering lines do not charge their own employees with the amount of car service lost through their errors. Why should there be such activity in goring the other fellow's ox?

Why draw the line on "errors of employees?" Delays arise from various causes other than error of billing—wrecks, diversion, delay in transit, insufficiency of power or yard room. Why should not the delivering road be paid for delay arising from any of these causes as well as for "errors?" If the delivering road may charge the forwarding (or intermediate) road for errors of this kind, why may not the latter charge the delivering road (at the same rate) for delays to its equipment at destination, where precisely similar conditions obtain? The "error in billing" would be offset by "failure to notify consignee." Again, if the delivering road may charge for errors of this kind, why may not the consignee or shipper? You are not only establishing the principle, but are furnishing the evidence necessary for him to make out his case. The generality of railroad men in our section of the country, so far as I have been able to learn, are not in favor of the proposed plan, either as a method of disciplining their employees or of settling with connecting lines.

#### Caledonian 50-Ton Ore Car and 6-Coupled Engine.

The latest goods locomotive and a new 100,000 lbs. steel car for carrying iron ore on the Caledonian Railway, Scotland, are shown in the accompanying half-tone. On this road, as generally in the British Islands, the clearances are less than in American practice. Mr. J. F. McIntosh, Locomotive Superintendent of the road, says that otherwise he would build the cars from 1½ to 2 ft. wider and higher.

Some of the leading dimensions and weights of the

operated as a unit, each unit having a motor disposed at the leading and back ends, and with a hand controller at each end.

Typical important installations were put in on the locomotive plan pure and simple in 1895 at Baltimore, and on the locomotive-car plan, under the supervision of Mr. W. E. Baker, on the Intramural road at the World's Fair in Chicago, in 1893, and on the Metropolitan West Side Elevated Railroad under the same supervision in 1895, at the former of which Mr. Baker had to override recommendations in favor of a locomotive.

#### The Sprague Multiple Unit Control.

For any given weight to be moved, whether it be in one or two cars, there is a certain capacity of motive equipment with which it is best to operate it under fixed conditions, and that is the motor equipment which should be put on that unit, not something either larger or smaller, and then when more capacity is required, to simply add another unit of like character.

A unit may be a single car or a pair of cars, and the number of motors used whatever desired. The logical equipment is two motors for each car, and when so equipped the importance of some of the practical results are emphasized.

Among the advantages which such a general system when fully developed must possess, may be mentioned:

(1). Similarity of Equipment.—This gives absolute flexibility of train operation.

It insures like characteristics for trains, whatever the length and whatever the combination of cars.

The motor equipment is directly proportional to the number of car units.

There is a practical fixed relation between the weight on the drivers and the total load whatever the length of train, and it is a matter of indifference to the motorman whether he is operating one car or any aggregation of car units in a train, for its characteristics are always the same.

(2). Independence and Facility of Operation.—Each car being lighted, heated and braked independently, has independent movement in yards or car houses or on the tracks, wherever stored, and thus inspection, repairs and train combinations are facilitated. The head and tail switching characteristics of locomotive practice is entirely abolished. Trains in whole or in part can be reversed at any cross-over,

(4). Reduced Strains.—All the longitudinal or shearing strains are greatly reduced.

The hammering on the rail joints, with the resulting shock to the structure and to the moving train, will be diminished because of the less weight per driver.

The thrust strains for any given rate of acceleration are equalized and distributed over a considerable length of structure, and become practically the reverse of the braking strains.

The strains on car bodies, platforms and couplers are reduced to a minimum.

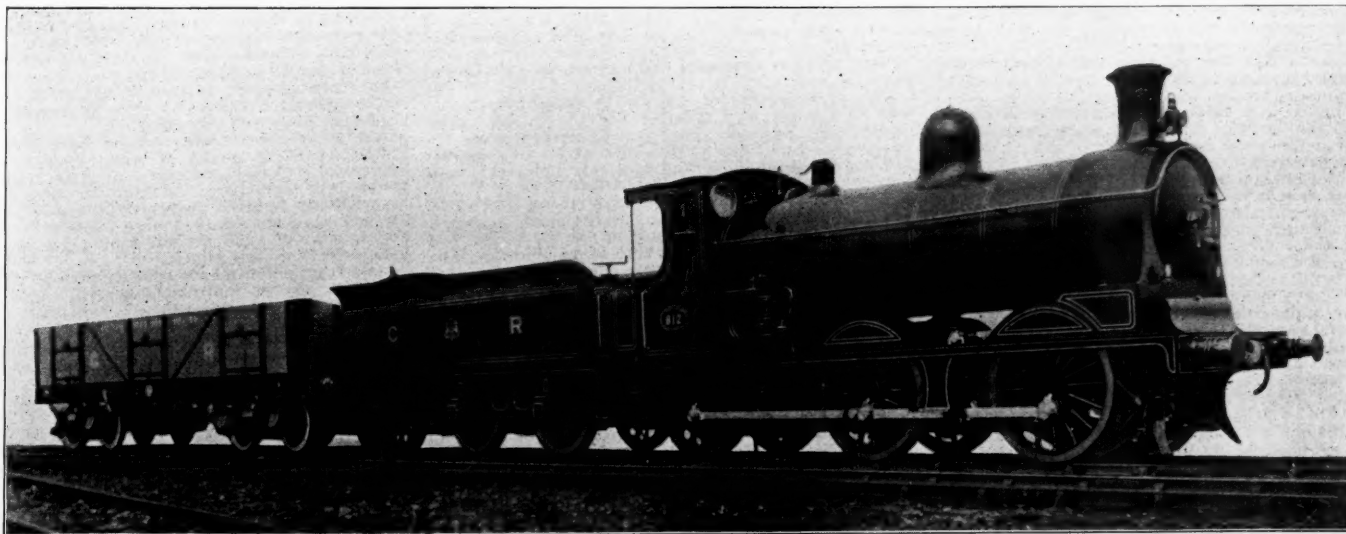
(5). Increased Density.—The safe time interval between trains for a given schedule and for any given length of train and station stop is dependent upon the maximum speed and the rates of acceleration and braking, and the greater these latter with any given schedule, that is, the lower the maximum speed and consequently the less the travel of the train after the brakes are applied, which distance varies roughly as the square of the speed at the time of applying the brakes, the shorter can be both the time and the distance interval between trains.

If there were an infinite rate of acceleration and braking, then there would practically be necessary, barring accidents, only that time limit between trains occupied by a train at and blanketing a station. In practice a motorman will approach a station with more confidence and under closer headway when his maximum speeds are low and the braking distance which he travels short, and when he has confidence that the train ahead, once started, will promptly accelerate and increase speed while that of his train is rapidly diminishing.

It is apparent, of course, that the length of a train is only limited by the platform accommodation.

(6). Better Equipment.—From this standpoint better motor manufacture is insured. There are fixed limitations of wheel base, track gage, wheel seat, diameter of axles and distances between axle and bolster, and hence there are practical limitations to the outside dimensions of motors. The smaller the capacity of the machine put into that space, the greater the margin for increase of dimensions of the essential working parts, such as bearings, gears and commutators, and the greater the freedom for inspection. Likewise, also, is there greater space for the application of any kind of brakes.

(7). Reduced Number of Cars.—With any given maximum hourly mileage, the number of cars in



The Caledonian Railway 50-Ton Ore Car and Goods Locomotive.

locomotive and car shown in the engraving are as follows:

Caledonian Railway Six Coupled Goods Engine.	
Cylinders.....	18½ in. dia. x 26 in. stroke
Wheels.....	5 ft. 0 in. dia.
Heating surface.....	1,440 sq. ft.
Working pressure.....	160 lbs. per sq. in.
Wheel base, engine.....	16 ft. 9 in.
total engine and tender.....	38 ft. 7½ in.
Tractive force.....	17,800 lbs.
Tank capacity.....	3,080 gal.
Weight of engine.....	102,370 lbs.
" tender.....	84,900 lbs.
Total weight of engine and tender.....	187,260 lbs.
Fuel space for 4½ tons of coal without heating.	

Caledonian Railway 50-Ton Iron Ore Car.	
Total wheel base.....	29 ft. 3 in.
Wheel base of bogie.....	5 ft. 9 in.
Length over headstocks.....	35 ft. 0 in.
" buffers.....	38 ft. 4 in.
Length inside body.....	34 ft. 7 in.
Width inside body.....	7 ft. 7 in.
Depth of body.....	4 ft. 0 in.
Journals (concave).....	12 in. x 6 in. and 7½ in.

#### Elevated and Suburban Electric Railroad Transportation.

By Mr. Frank J. Sprague.

A survey of the record giving the steps from 1880 in the development of electric roads with special reference to high speeds and heavy service up to and including the first proposals made as late as the spring of 1897 to the South Side road, shows that with the exception of proposals made by me at various times beginning at the Society of Arts, in Boston, in 1885, and ending in definite proposals to the Manhattan Elevated in 1896 and 1897, there were no propositions, or even a suggestion to equip a railroad on any other than a locomotive or locomotive-car plan, with the single exception that on the Liverpool Overhead Railway, where two car trains are

\* Extracts from a lecture before the American Institute of Electrical Engineers on May 16, 1899. The author opens with a discussion of some of the more general problems in electric railroad working, and later takes up many of the details of the South Side Elevated (Chicago) installation. These have been omitted in our abstract, since they have been pretty carefully discussed in our columns from time to time. The part of the lecture here printed has to do largely with the merits of the Sprague system.

thus reducing the dead mileage and intensifying the car movement to meet the conditions of passenger movement. Cars can be added to or taken from a train in a third of the time that is possible with a locomotive system. Where a system has main tracks with branches, car units for the different branches can be aggregated on the main line and then split at the junction, thus preserving the time intervals on the branches but doubling the distance intervals on the crowded sections. The fullest use can be made of all sidings and tracks, wherever located, for storage, and in a large measure for inspection, which insures less dead mileage and useless returns, and effects concentration of car movement impossible where the cars must be stored in one place.

(3). Increased Schedules.—Any required rate of acceleration or schedule speed up to the maximum becomes possible, thus giving the highest schedule with any given maximum, and the lowest maximum with any given schedule.

A partial equipment may be made by equipping alternate cars, and this schedule later increased by additions to the existing equipment without changing its character.

Local and express service can be operated with greater or less aggregation of motor equipments.

It has been suggested that with a locomotive system, when trains are reduced in length, and the service on the road is diminished the locomotive car can then increase the schedule, and that during the times of heavier traffic it still has capacity enough to pull a train. Such an argument is a reflection on the common sense of a railway manager, and such practice a parody on railway operation. The time above all when schedule speed, capacity and effective operation are required is when traffic is greatest and the road most liable to congestion. It is difficult to see how any engineer can seriously offer such an argument in support of locomotive practice, for it is directly contrary to the most vital requirements on a railroad.

If, as is vital in competitive service, a high schedule is necessary, and ignoring for the moment all questions about relative strains, weights, facility of making up and controlling trains, and the advantages of variable train lengths and intervals, when we come to six or seven-car train units a high schedule with short interval stations is impossible except with two heavy four motor locomotive cars or with every car equipped with a pair of motors. And from every point of view, the latter is preferable.

service or on relay will vary inversely as the schedule. This advantage is further augmented by those already instanced, the concentration of car movements where most desired, and the storage of cars at the most convenient points, with consequent less dead mileage.

(8). Simplicity of Operation.—The operation of the multiple unit system becomes the simplest. Every motor car or pair being a transportation unit, and every aggregation of such being, so far as the motorman is concerned, simply an extension in the length of the unit without in any manner changing its character, the operation becomes almost automatic, a sort of second habit. Like hand and like train movement exists whatever the combination, and wherever the motorman is situated.

The making up of trains, so far as electrical features are concerned, is as simple as coupling up an air hose.

No main currents are carried from car to car, only small currents, through reversible jumpers, and the electrical combinations are effected automatically, however the trains are made up and whatever the end relation of the cars.

Protected by the automatic features, a child of ten years can handle full-sized trains on regular service with less trouble, so far as the electrical apparatus is concerned, and with less instruction than is required for the simplest form of air brake.

(9). Ease of Inspection.—The train line and the main motor circuits being absolutely independent, and provision being made on any car for cutting out a set of motors, facility exists for an easy inspection wherever the cars are located. Almost all the working parts of the motors can be inspected through the trap door in the bottom of the car, and since the cars have independent movement and can be rapidly run through an inspection shed over a pit, a little practice enables an inspector to make the most rapid survey of trucks, brake rigging, motors and everything else which is under a car.

(10). Economy.—Transportation wages per car mile, the largest element of cost, are reduced because of the simplicity of operation, and because of the increased schedules. With the same efficiency, there is less power per car mile expended, and hence less coal burned, for any given high schedule with like conditions of traffic than with a lower rate of acceleration because of the less amount thrown away in braking. The increase of power required because of



low acceleration over high is anywhere from 25 per cent. to 50 per cent.

When it is realized that a system like the elevated railroad would use only one-sixth of the power actually used now if it made no stops the importance of this fact may be seen.

The question of coal economy is of less importance, however, than many other features of railroading, and, from a financial standpoint far less important than getting absolute freedom in determining train intervals and train lengths. In this connection it should be noted that altogether too little consideration is given to the question of car construction and car weights, and it seems to be forgotten by many engineers that useless tons of dead weight moved represents unnecessary investment in plant and a continuous charge against operating expenses, and it is about as sensible to ignore this question as it would be to add pig lead to a car having all of its weight on its drivers to increase its traction. If half the gray matter was spent in reducing useless tonnage moved as there is in bargaining on the cost per kilo-watt of apparatus, the cost per car mile and the ratio of operating expenses to receipts would be gratifyingly reduced.

(11). Safety.—The highest safety is essential. In the case of failure of brakes or on slippery rails, the machines throughout the entire train can be safely reversed. The current input to the machines is automatically limited on each one to its safe capacity. In case an accident should happen to an operator and he lets go of his controlling handle, the entire power is instantly removed from the train, and in case the controlling apparatus on the leading car should become disabled the train can be operated from either end of any other car.

In fog and on slippery rails a fixed schedule can be maintained more effectively because of the lower maximum speed, the less distance traveled in braking, the greater confidence in approaching a station, and the promptness of the leading train in getting away.

On account of the reserve capacity of the machines it is possible to make up time in clearing a road, which is a matter of the gravest importance on a congested system.

The automatic cutting off of current will have an important bearing in a not distant future when a Legislature is apt to and should prohibit the operation of a train with only one man in front unless there is some certain method of removing the driving power in case of accident to the operator. This is an instance of where a small thing, possibly determining the employment of several hundred extra men, has a vital importance.

(12). Least Cost.—The multiple unit system means lowest first cost as well as lowest cost of operation. This is contrary to first impression, but the explanation is simple. The cost of the delivery of electrical energy to the car shoes per unit of constant use is eight to ten times the cost per unit of maximum capacity of car equipments; and by using the higher rate of acceleration rather than the lower for any given high schedule, the aggregate cost of the total equipment from power house to car equipments for any given hourly mileage is less, because, notwithstanding the increased cost of car equipment, the difference of economy creates a saving in that portion of the electrical equipment (that is, in generation and distribution), which costs so many times more per unit equipment than the units of car equipment, and the latter increase is more than made up by the saving in the former.

The essentials of the multiple unit system are not complicated, despite the remarkable variety of functions which they have. They may be stated briefly to be as follows:

1. The master controllers on the platforms at each end of a transportation unit. They are of the simplest and most reliable character.
2. The master controller and train line cables, which become parts of the permanent wiring of a car, and are just as reliable and as simple as that for the lighting system. These secondary controlling cables are absolutely independent of the main motor circuits, and carry very small currents.
3. The jumpers, which are removable sections of the train line and connect the parts of the latter which are permanent to each car, just as air hose couplings connect up a brake line.
4. The main controller, which is composed of the following parts:

Certain relays and a throttle, developed in electric elevator service.

Pilot motor with automatic limits, something like that used in elevator controls, but of more robust make.

A rheostat cylinder, with or without motor grouping switches, the parts similar to those of hand control, and

A reverser with like parts, but independently operated.

The braking system, whether using automatic air or electric, is something like the multiple unit electric system. There is a train line with means at each end of each transportation unit for simultaneously applying the brakes. When automatic air is used there is a train and equalizing line, a compressor with an automatic governor, illuminated gages and a simple form of engineer's valve at the ends of each car for each transportation unit.

The first car was run on the South Side road April 15; on April 20, 20 cars were put into initial operation, 17 of which came off by night because of defective rheostats, but by July 27, locomotives had been entirely abandoned.

Subsequently 30 "train line" cars for insertion into trains during periods of heaviest operation or on special occasions were added, and since then 30 more cars have been fully equipped.

The equipment of the South Side road has been made on a mixed plan, 120 cars first being each individually equipped with two motors, then 30 cars with a "train line" but without motors, and finally 30 additional cars completely equipped.

The variation of car aggregation, and the further condition that no seat room should be taken up by the motorman, made it necessary to provide each car with a movable cab on the platform such that it could be left open for the free use of the ordinary entrance gate when in the body of the train, and yet be readily closed and afford protection to the motorman when at the leading end, at the same time allowing free passage from one car to another. On each car, therefore, at the right hand diagonal corners the iron work has been removed, and a three part cab constructed, the outer end being a fixture with a drop window, and carrying in the angle formed by the platform the initial con-

trolling mechanism, being the master controller for the electrical system, and the engineer's valves for the air brakes. On each side is a door, each hinged in opposite direction, and folding back one over the other against the header of the car, leaving when in this condition the platform clear, and the ordinary gate in operation. When used by the motorman, one or both doors are closed, the iron gate swung in place, and a small protecting cab is the result.

Under one end of the car, in place of the ordinary truck, is a motor truck carrying two 50-h. p. (hour rating) standard railroad motors of capacity and gearing such as to safely allow the motors to work up to the skidding point of the wheels with 60 per cent. of the weight of the car equipment and load upon them.

The motors are of the General Electric manufacture, and of the usual Sprague suspension. In the hood of each car is a controller for the motors inclosed behind a trap door which can be lowered for ready inspection. The controller is of the multiple series type, is driven by a small pilot motor, and provision is made for at will or simultaneously producing a step by step, or interrupted or periodic forward movement of the controller, and a continuous or interrupted return movement of it to the off position through various automatics connected with the pilot motor and the initial control circuits.

In addition to the current varying controller, there is a main reverser, likewise operated by the same agencies as the pilot motor, for determining the direction of the current delivered to the motors, and for instantly opening the circuit of the motors in case of emergency.

Inside of each cab is a small master controller or operator's switch mounted on a standard, and fastened to the wood work of the cab. Through this master controller the pilot apparatus of the current varying controller and the reversers are governed. It is provided with a movable handle operating a spring retracted spindle which through various degrees of movement makes contact with the reverser circuit and with three determinate positions, coast series and multiple. Momentary contacts on these various points give any desired intermediate position of the main controller, which has a stepped movement. In order to maintain the controller at any point, or to keep the governing circuits or train lines energized, the handle of the master controller must be held in position. If the handle is released, whether from accident or design, the spindle instantly returns to coast position, and the controller automatically returns to the off position and cuts off the current, or if the master controller is allowed to go to the center position, the reverser is instantly opened and the controller then comes to open circuit also automatically.

The arrangement of circuits is such that by the use of a relay and throttle and the proper interconnection between the controlling circuits, the operator is at liberty to do about as he pleases with the master controller, and can rely upon the main controller operating satisfactorily.

The practical result of the system is that every aggregation of cars, whether one or more, has identically the same characteristics in the matter of load, capacity, motor equipment, rate of acceleration, etc., as are possible with a single car, and every combination is made without the slightest thought being given to pairing of electrical circuits.

Each car is equipped with an automatic air brake system, supplied by Christensen air compressors, with a reserve tank, and an equalizing pipe running from car to car, the compressors being started and stopped automatically through an air governed switch by fall and rise of air pressure.

On each platform, alongside of the master controller, is a small engineer's valve, so that from any selected cab the air brakes can be operated with equal facility.

A balance wire runs throughout the train, and is included in the same coupling as connects up the electrical train line, so that when an air governor on any car closes circuit, all compressors start and continue in operation until the last governor throws out. This is to effect equal work on the various compressors, and to maintain absolute certainty of air supply at all times.

If a train should part, three systems of automatics come into play. The reversers go to open circuits, the controllers to the off position, and the air brakes also automatically operate.

If the main circuit fails, all reversers open instantly, and the controllers must come to the off position, which they will do automatically as soon as current is restored, before current can again be put in the main motors. If there is an instant reversal of the master controller, the reversers first open circuit, the controller returns to the off or any determined position, then start again, and are instantly arrested on the first contact. Provision is made so that it is impossible to run backward at more than one-half speed from any platform when operating from that platform.

The average duty of this equipment is higher than that of any other elevated railroad in the world. Cars have frequently made as high as 290 miles a day for days in succession, and the average maximum of cars in operation for long periods ran to nearly 100 per cent.

Financial, not alone technical results are a measure of success, and a comparison is therefore in order.

The months of November and December, 1897 and 1898, are the first strictly comparative months.

The road then included "Loop" operation, 19.44 miles of track, in 1897 was operated entirely by steam, and in 1898 entirely by the Sprague multiple unit electric system.

In addition to all "Loop" expenses there is a rental charge equal to 10 per cent. of the gross passenger receipts of the road. This should be considered really as an interest charge, not as an operative expense.

For these two months with an average of 489,979 car miles on the main line, the comparative table following shows:

	(a)	(b)	(c)
November, '97, Steam.....	87.3	77.7	\$10,602.80
November, '98, Electric.....	57.3	47.7	39,448.56
December, '97, Steam.....	89.6	73.8	14,691.69
December, '98, Electric.....	55.0	45.4	45,355.68

The succeeding months show increasing traffic and equally favorable results.

The operating expenses per car mile during November, 1898, on the main line, including and properly apportioning to it everything except licenses, taxes and rental, were less than seven and one-half cents on an average and maintained schedule of fifteen miles an hour, with stations 2,080 feet apart.

It is curious that there have been more troubles with what is classed as "standard apparatus" than with that individual to the multiple unit control. These latter troubles were first, with the rheostats, which were of new construction, and later, poor brush terminals, cracked gear cases, and with the earlier type of air governors.

Coming to New York conditions I may say that, based upon the Chicago performance, and allowing for difference of coal cost, the Manhattan road, now operating at 12½ miles actual schedule during time of maximum load, and making about 43,000,000 miles annually, can be operated at over a 16-mile schedule at not exceeding nine cents, instead of 11.9, and on the existing mileage this would mean a saving, excluding interest on investment of about \$1,250,000 per annum, or allowing interest on investment of about \$750,000, to say nothing of any other gains. A 17-mile schedule can actually be made with two motor equipments.

In closing, perhaps I may venture an opinion as to the general features which should characterize a suburban passenger railroad equipment. I think it may be safely stated that the first is the use of the continuous current in the motor equipment in spite of the claims which have been made and the results accomplished with alternating current motors, at least so far as we can judge by any present developments.

The problem then is whence shall be derived these continuous currents, and that depends upon distances. For moderate distances, continuous current generators supplying current directly to the line with or without the addition of storage batteries is preferable. When the extent of the line becomes at all serious, then it must be considered as made up of a number of shorter sections joined together, each of which derives its principal source of supply from a local station, which station can be driven directly by water or steam power, or by an alternating current from a distant station, using a motor-dynamo combined in a single type of machine, the rotary converter, or joined in the form of a directly coupled set, the dynamo end being for continuous current and the driver a synchronous or induction type of motor.

Generally the sub-station should be supplemented by a storage battery, to take care of fluctuations in the load, to make even the duty on the sub-station and as far as possible at the central station, and to take care of some portion of the peak load caused by abnormal variations in the aggregate service at different times of the day.

Of course, with the storage battery comes the necessity of a means of some kind of automatic regulation; there are various methods, but I will not enter into them here. Looking forward, however, to a perfectly assured future of a heavy service over considerable distances, I may state that the general equipment of such a road should generally involve the following essentials:

- (1). High potential alternating current transmission from one or two well placed central stations, with or without static transformers.
- (2). Motor-dynamo sets, or rotary converters at a number of conveniently placed sub-stations, to convert high pressure currents into continuous currents of about 600 volts pressure.
- (3). Storage batteries of quick charge and discharge capacity at the same sub-stations as the motor converters to equalize their duty and to prevent sharp variations in the generating plant as well as the sub-station.
- (4). A system of feeders and main conductors.
- (5). A power rail or trolley wire supplying continuous current, but ordinarily without any switching of currents.
- (6). Individual transportation units with a multiple unit control.

#### Abstract of Discussion.

Mr. Blood: I would like to ask the maximum acceleration you get on the South Side Elevated, Chicago, in either pounds per ton or feet per second.

Mr. Sprague: We have gone up to the slipping point of the wheels, which would be 300 lbs. for each ton on the drivers with normal condition of track. We do not force the machine to quite that extent. Being a two-motor equipment with double trucks, we average 61 per cent. on the drivers, and that does not vary with the load more than about 3 per cent. either way. Fifteen per cent. adhesion gives 300 lbs. to the ton if anything was on the drivers. We can certainly work to 150 lbs. actual pull. Of course, in braking you have every wheel in operation, and also have all your weight. If you should work up to the slipping point, we would have 180 lbs., provided the track is in good condition. We do not work quite so high, since there is nothing to be gained.

A Member: What would happen if the pilot motor was injured or was burnt out so that the controller would not respond?

Mr. Sprague: That could not well happen on all the cars at once. There is no possible excuse for small motors being made so that they are not reliable. The controller, you see, will handle two 50-h. p. motors, each of which is guaranteed to work up to 100 h. p. It is not a very large piece of apparatus—in fact, about the size of an ordinary street car controller.

To operate one of these requires an eighth of a horse power pilot. This pilot runs cold, because it only operates spasmodically. They have only a fraction of the duty a fan motor of the same rated capacity has.

But let us assume the possible conditions of an injured series controller. Nothing disastrous will happen. If we wish to open the circuit, we can open it instantly on the reverser without regard to the main controller, and, having once opened, it is impossible for that particular reverser to come back until its controller has been returned to any determinate position it is set for. The reverser circuit passes through split paths. The initial path is through a contact carried on the main controller, which, when the controller has advanced one step, is entirely cut out, but a supplemental circuit, dependent on the current in the reverser circuit itself, has meanwhile been made, which maintains that circuit although the original path is wide open. If this supplemental contact for any reason opens, there is no method of again making the main circuit on that car until that main controller comes to any required position.



tion, generally the coast or first contract position. Of course, if there are three or four cars in a train, one equipment can be entirely cut out and the schedule speed made by forcing the balance of the motors. It is a matter to which we pay little attention in practice. This possibility was one of the first things which occurred to us, but it was met by affording two absolutely independent methods of operating the main circuit, one preferably power driven, and the other automatic, the operative relay circuits of which are electrically interconnected so that when once the main circuit is opened it cannot be again closed except under perfectly safe conditions. It would, of course, be a serious objection if provision had not been made for this very possibility.

A Member: Would the fact that a controller was not working be known, and can it be rectified while on the road?

Mr. Sprague: Yes, but ordinarily little attention would be paid to it until arriving at the yards. The guards and motormen very soon get used to the equipment. If the controller does not move, they know something is up, and when they pass the dispatcher they report that on a certain car the controller is not operating. The train does not stop; it goes on. When the car is in operation one can open and close the main circuit breakers without any other effect than simply throwing additional load on the balance of the equipment, the counter-electromotive force, of course, protecting the machines.

Mr. Blood: It seems to me the argument has been made for motor and controller for controller per se. Would it not necessarily be that if you had ten motors and twenty controllers you would be liable to have proportionately more trouble in proportion to the number of instruments than with four motors and two controllers?

Mr. Sprague: Possibly I am more of a railroad than an electrical engineer. To my mind there is something more to be sought in railroad engineering than the saving of a pound of coal or a dollar in inspection or repairs. It is to catch the passenger's nickel, and it does not take much variation on a road to determine its success or failure. If you put the abstract question of whether it is cheaper in the matter of attendance for one man to take care of one motor with one controller, than several, that is, of course, true.

Mr. C. W. Rice: I should like to inquire the relation of the storage battery to the success of the multiple unit system.

Mr. Sprague: It is not a necessity for the success of the multiple unit system. There are a good many railroads running independent cars without a storage battery. We all know that in any system of transmission of power the more even the output the better it is for the central station. The South Side road ran for a long time without any storage battery, which was not proposed as a part of its original equipment. . . . I would say in general, however, that the introduction of a storage battery is advisable on any elevated or suburban road, and, in fact, on any electric railroad when its capacity is to be increased.

Mr. H. Ward Leonard: It seems to me that one of the most important points in connection with the question of elevated practice, as has been clearly brought out by Mr. Sprague in his remarks and by many others heretofore, is the fact that a very rapid acceleration is a necessity, and that having stored up in the train a very large amount of energy represented by that acceleration, it becomes necessary with the practice which has been described to waste that energy on the brakes, and it seems to me that there are great possibilities in providing for the return of this energy to the line.

Mr. Sprague: The maximum speed at which a train is braked is what determines the amount of energy thrown away, and we reduce the kilowatt hours per car mile by keeping that maximum speed as low as possible. On the South Side road our maximum speed is often only 50 per cent. higher than the schedule. We actually do a great deal of coasting.

Coming back now to the question of schedule speed, high ones, with stations only a short distance apart, are only possible by using a high rate of acceleration, and it is impossible to get it except with high weight ratios. Take, for example, the Manhattan road in New York. Its stations average a third of a mile apart. It is making now 12½ miles actual schedule during the time of maximum load, averaging its entire runs. On Sixth avenue below Fiftieth street and on the lower part of Third avenue its schedule speed sometimes gets down to 11 miles an hour; but the average is brought up to 12½ miles. It is possible on that road to make a schedule of 17 miles with only two motor equipments per car, although that is pretty nearly straining the limit, but it is quite practicable to make over 16 miles; in other words, to bring Harlem abreast of Central Park; that, too, without exceeding the present maximum speed of trains, and with a reduction of the strains on the structure.

Mr. Armstrong: I would like to ask if the multiple unit system is needed for the schedule speed of 15 miles an hour made on the South Side elevated.

Mr. Sprague: It would be possible to make that schedule with fewer motors and more concentration. They could not, however, make the schedule which they will be driven to.

Condensed Chronology of Electric Railroads from 1880 to 1899.  
1880.—Edison built and ran at Menlo Park an electric locomotive, and subsequently designed some others.  
1883.—Daft at Mt. McGregor ran the Ampere, pulling one car, and Field, at Chicago, the Judge, also pulling one car.  
1884-5.—Vandepoelle at Toronto, and later in 1885 or 1886, at Minneapolis pulled trains of cars with an electric locomotive.  
1885.—Daft, at Baltimore, operated a locomotive and trail car, subsequently increasing the equipment, and on the Elevated road pulled a train with an electric locomotive for experimental work.  
1886.—Sprague built the first locomotive car. This was intended for experimental work on the Elevated road, but was abandoned before the motors were completed.  
1886-87.—Sprague operated a standard elevated railroad car with two axle reduction motors, axle centered, and with one end spring supported from the truck body, on the Thirty-fourth street branch of the Elevated Railroad and also pulled a trail car, and prior to this, a platform car with the same motors in the Durant Sugar Refinery on Twenty-fourth street, New York. This was followed by the Richmond equipment, the beginning of the modern development.  
Nov. 4, 1890.—City & South London road opened. Originally designed for cable. Light trains operated by electric locomotives having two gearless motors with the armatures rigidly mounted on the axles of drivers.  
Feb. 4, 1893.—Liverpool Overhead Railway. Operates two-car trains, each car having one motor disposed at the leading and back ends of the couple, the two cars being kept together as a unit. Hand control at each end.  
Spring of 1893.—Under the general supervision of Mr. W. E.

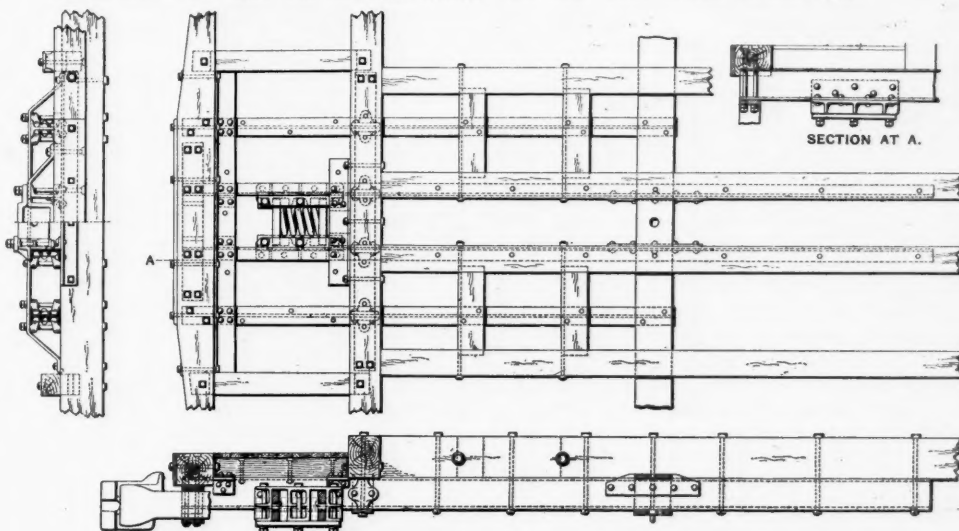
Baker, assisted by Mr. B. J. Arnold in charge of the steam plant, and Mr. Charles H. Macloskie in charge of the car equipment, the Intramural Railway was constructed at the World's Fair. The General Electric Company were largely interested in this enterprise. Four-motor cars, with hand control, were used to pull three trail cars, this plan of distributed motors under the passenger car having been advocated by Mr. Baker in opposition to the general opinion then in favor of electric locomotives. The third rail supply with the flexible sliding contact shoe, was here used for the first time, and the road may be said to be the first real practical train operation on any serious scale in this country.

May, 1895.—Metropolitan West Side Elevated Railroad equipped under the supervision of Mr. W. E. Baker, and using General Electric Company's apparatus, opened on locomotive car plan, using two motors on locomotive cars. This was the first commercial elevated road put into operation in the United States.  
June 27, 1895.—First of three 35-ton locomotives put in operation in Baltimore, by General Electric Company for pulling freight and passenger trains through B. & O. tunnel.  
Sept. 20, 1896.—Lake Street Elevated Railroad, which had been operated since October, 1893, with steam, began electrical operation, plans similar to those on the Metropolitan.  
July 16, 1896.—Exhibition of contact pin system made for benefit of Manhattan officials.  
May, 1896.—Nantasket Beach Railroad put in by the N. Y. & N. H. R.R., under the supervision of Colonel Heft was opened—used General Electric apparatus and a locomotive car carrying passengers and pulling a trail car.  
Nov. 23, 1896.—Under the supervision of Mr. C. B. Martin, electric service was instituted on the Brooklyn Bridge R.R. Twenty motor cars, each equipped with four General Electric Company 6½ h p motors, and hand control replaced the steam shifting engines, and were used in connection with the cable.  
November-December, 1897.—Sprague made working test of multiple unit train on Metropolitan Elevated, of Chicago, of five-car multiple unit train.  
April 20, 1898.—Sprague began operations on South Side road with multiple unit system.  
June 18, 1898.—Sprague began operation on the bridge end of the Brooklyn "L" road.  
July 12, 1898.—Waterloo & City, London. Straight run one and one-half miles, no mid-station. Operates light four-car train units, the two end ones being motor cars with two motors, and the intermediates being dead cars.  
July 27, 1898.—Multiple unit system in full operation on South Side road, and steam abandoned.  
Equipment on South Side road afterwards increased to 180 cars, 150 of which are fully equipped, and 30 for emergency service, partially equipped.  
Nov. 1, 1898.—Westinghouse Company began to put 20 cars on the Kings County Elevated Railroad, each equipped with two sets of two motors with controllers actuated

coupler failures on the Nashville, Chattanooga & St. Louis for the seven months ending with August of that year. We have since received further reports from the road, giving similar information for the five months following August, and the table below gives in tabular form the principal causes of these accidents to trains during one year ending with Jan. 31, 1899. In our issue of Oct. 14, 1898, page 744, may be found a list giving the causes, for one month, somewhat more in detail than they are shown in the present table:

	7 mos. 5 mos. 12 mos.	
0—M. C. B. coupler parted, knuckles worn	2	2
1—M. C. B. coupler unlocked	35	58
2—M. C. B. knuckle broken	14	5
3—M. C. B. coupler broken	7	12
4—Coupling pin lost or jumped out	30	21
5—Coupling pin broken	25	49
6—Link broken	18	20
7—Tail bolt broken	28	27
8—Tail bolt key lost	27	32
9—Tail bolt key broken or sheared off	9	7
10—Tail bolt lost	2	0
11—Draft rigging broken	8	7
12—Draft timber bolts broken	2	2
13—Drawbar (old style) broken	4	9
14—Loose carrier iron	1	0
15—Failure of drawbar between engine and tender	1	0
16—Unclassified	2	11
17—Unexplained	1	2
18—Miller drawbar broke	1	1
19—Miller knuckles worn	1	0
20—Weak side spring (Miller)	1	2
21—Strap broken, continuous drawbar	1	1
Total, year to Feb. 1, 1899	217	268
		485

It will be noted that in the table all of the couplers included in items 0, 1, 2 and 3 are of the M. C. B. type; all in items 4, 5, 6 and 13 of the link and pin type, and in items 18, 19 and 20 of the Miller type. The other items include various types.



New Standard Steel Caboose Platform—Made by the Standard Coupler Co., New York.

by air pistons and controlled by a secondary electric circuit. Four only out of the twenty cars are in use at present and these are for locomotive purposes.

#### Steel Caboose Platform.

The drooping common to caboose platforms made of wood and their frequent failure to resist the severe lateral strains in ordinary service, has led the Standard Coupler Co., of New York, to put on the market a steel platform for cabooses designed by Mr. H. H. Sessions, Vice-President of the company. The standard steel platforms for passenger cars have been in use for two and a half years, during which time they have been introduced largely in all parts of the country and the satisfactory results obtained therefrom have led to the caboose platform design shown herewith.

Instead of the wooden timbers, steel I beams are used, which extend back through the transoms, shifting the fulcrum from the end sill to the transom, thus relieving the end sills of severe strains. In fastening the platforms to the end sills, where the greatest strains are, the bolts do not pass through the flanges of the I beams, but through malleable iron brackets riveted to the webs of beams, thus maintaining the full strength of the beams at this point. Because of the greater strength and stiffness of the I beam, no truss rods are required. These truss rods in wooden platforms intended to prevent drooping do not strengthen them against lateral strain or prevent their being broken upward in case of collision or other severe shocks.

Steel platforms for cabooses have been put on cars of the following roads: Illinois Central, Chicago, Rock Island & Pacific, Chicago, Great Western, Minneapolis & St. Louis, Oregon Short Line and Chicago, Peoria & St. Louis.

Mr. H. H. Sessions is also the originator of the design of steel platform for passenger cars, references to which will be found in the Railroad Gazette of Feb. 5, 1897, June 10 and Aug. 12, 1898.

#### Causes of Trains Breaking in Two.

In the Railroad Gazette of Nov. 4, 1898, page 790, appeared a statement showing the causes of car

As will be understood by readers acquainted with the subject and by those who read the former articles, the causes, as stated in the summary, might often be supplemented by additional reasons, such as iron of poor quality, or rough handling of cars by trainmen, or bunching trains without sufficient care, or too sudden application of air brakes.

Mr. J. W. Thomas, Jr., General Manager of the road, has favored us with the following succinct summary of the salient points observed by him in examining these reports from month to month:

1. The tail bolt and its key are crude affairs, and the source of many accidents, and should be discarded as rapidly as possible. In eighteen months there have been but two cases of yoke straps giving way. One of these straps was evidently bent cold, the fibre of the metal being so distorted as to leave only about one-quarter of an inch of solid metal where it was bent. Unfortunately the other strap was not sent in for examination.

2. In this day of heavy trains, the vast majority of which are partially equipped with air, the link and pin have developed a marked weakness.

3. Draft springs must be of sufficient dimensions. Many cases of M. C. B. couplers parting can be traced to weak draft springs.

4. Lock rods and chains should receive more attention. Some chains are too short. In a number of instances chains with long links have been caught between the coupler and end of car, or deadwood, and bent so as to shorten the links sufficiently to raise the lock when the drawbar is pulled out more than usual.

5. M. C. B. couplers must be more closely inspected and worn parts replaced.

6. Some new M. C. B. couplers have contour lines which are barely within the limits as set forth by the M. C. B. Association. Many are of very poor material. Many others are poorly fitted up. With such couplers conductors find it difficult to determine the causes of failures.

7. Records of all cases of trains parted are of much value, especially where the couplers are of the M. C. B. type. Broken parts should be examined. (Continued on page 494.)

\*[The following notes in connection with Mr. Sprague's paper refer only to work actually done.]





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#### EDITORIAL ANNOUNCEMENTS.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

We noted in our news columns during the month of June orders for 5,069 cars. Of these 1,726 were box, furniture and refrigerator cars; 2,531 were coal and gondola cars; 346 were flat cars; 375 were steel cars, and 91 were passenger and street railroad cars. Orders for 118 locomotives were also noted, 9 of which were for foreign roads, and of the total of 118, 53 were for passenger, 52 for freight and 13 for switching service. The orders for locomotives show a slight reduction from those recorded in May, when 122 were ordered, but as deliveries are still put off until well into the Fall, and even into next Winter in some cases, there seems no lack of work for the locomotive builders. The car orders show a gain of about 200 over those placed in May. It is now possible to get somewhat earlier deliveries of cars and we understand that a number of large orders are being considered by different roads.

In the Railroad Gazette of June 9, in a descriptive article, appeared this statement: "In tensile or bending strength, weight for weight, wood is the strongest material known in the arts." It is hardly necessary to say that no writer of an unsigned article in the Railroad Gazette would have been permitted to say that in that sweeping and unqualified way if the editor had been awake and on guard; but the editor must take the consequences of his want of vigilance. In the first place, the statement is not true, for no wood is as strong as steel piano wire. But, speaking within the limits which the writer of that article had in mind, and which he ought to have held strictly before the mind of the reader, and which is really clear enough to the careful reader, the statement is probably theoretically true. That is, mild structural steel, such as would be used for a framed structure, is probably not as strong, weight for weight, as the best yellow pine which would be used for a similar framed structure. D. K. Clark, Trautwine, Merriman and J. B. Johnson will all furnish authority for this statement. But for reasons too well known to be developed here, we cannot get, in construction, so close to the theoretical value of wood as of steel, and therefore a larger factor of safety must be used. Hence, in the end, a wooden structure of equal strength must, as a rule, be heavier than a steel structure. All this the writer of the article to which we refer had in mind, and this he makes apparent enough to anyone who wants to see it; but he believes that, in the structure which he describes, such arrangements have been made for joints and connections, and that such a disposition has been made of timber and metal, as to realize all the theoretical advantages of wood. It is not necessary to enter now into an analysis of the structure in question to try to settle this question. We prefer to let it settle itself by trial, for which there will be an ample opportunity.

The new code of train rules of the New York, New Haven & Hartford, a notice of which is given in another column, is a compilation of great merit.

We cannot give the reader a detailed critical judgment upon it, for in the nature of the case that would require several columns more than he would care to wade through; he should get a copy of the book and read that. If one were to praise the book in a lump, he would have to grade it below that of the Cincinnati, New Orleans & Texas Pacific, because in the numbering and in other features it sacrifices uniformity, where Mr. Felton did not. On the other hand, the variations from the standard (or what was once the standard) which the New Haven people have introduced are in many cases decided improvements in language or practice. One of the chief virtues of the book is the omission of rules which no one ever expects to see enforced; though we shall not be so rash as to say that the work is perfect in this respect. The flagging rule is notable for going into details, according to the time-honored custom, whereas other recent compilers (including the Pennsylvania) have taken the short "principle" of the Association for their rule. The New Haven has in this rule some safeguards that we have not seen elsewhere; while at the same time it omits one well-known safeguard—the rule that a conductor, after calling in a flagman, shall at once move his train forward, if on a curve, so as to get into a place where there is a good view from the rear before losing the protection of the flag. This rule (99a in the C., N. O. & T. P. code) affords the simplest means of providing for cases where a flagman does not get back the full distance. To light a fusee does not fully provide for this contingency. If we could always assume that a flagman only half-way back had used up only half of the time necessary to go back the full distance we might say this rule was of small importance; but such an assumption is not always warranted.

In the interests of the refined residents of Boston, New Haven and Norfolk Downs (New York doesn't care), we are impelled to protest against the very long whistle sounds prescribed in the New Haven code. We should suppose that anti-whistling ordinances would be passed in every town and city. It is true that the New Haven is no worse than other roads, but we had supposed that in the poetic atmosphere of Eastern Massachusetts we should find a higher standard than elsewhere. The whistling will, presumably, be no worse than heretofore; but the difference is that now the long sounds are officially prescribed, while before an engineman with fine-strung nerves, and bowels of compassion for the sick and the sensitive, could shorten the blasts to a reasonable length. Such a runner will sound the highway crossing signal (— — — —) in two seconds; the New Haven code requires five seconds, without counting the intervals. This is suitable only for the wilds of Wyoming. A New Haven train approaching a station must herald itself by a single blast of four seconds, a truly barbarous use of steam, and worthy only of the mountain divisions of the Canadian Pacific. The Fitchburg road, which is on the same side of Boston as Harvard University, used to teach its enginemen to make four short blasts in one second; one long and two short in 1½ seconds, and the highway signal in 2½ seconds. We do not know how well these lessons were taught, but the educated enginemen of the New Haven road would, very likely, adopt the Fitchburg idea on a simple hint from the superintendent without any teaching. It will not be necessary to move the road over to Cambridge.

The foregoing criticisms should be copied by the Boston Home Journal. We should not offer them except as a favor to our friends who reside near the railroad in that vicinity. But Rule 58 deserves criticism on principle. It requires that "all fixed signals be approached with train under control and prepared to stop before passing any stop signal." Why should a distant signal be approached under control? In this case what does "under control" mean? If it means be able to obey the distant signal, it means that the runner may continue at 40 or 50 miles an hour until he sees the signal, even in case of thick fog, for if the signal is rightly located he does not need to prepare to stop until he passes the signal. This being the case, the use of the term "under control" befogs the meaning of the same words when used to indicate that a runner must approach a certain spot prepared to stop at that spot. In clear weather, on a straight line, a runner may pass a distant signal at high speed, and still be really running "under control," as far as that signal is concerned, for he knows that according to the signal he will not have to stop until he has gone 1,500 ft. or 2,000 ft. or some other known

distance farther; but this is a strained construction to put on the phrase. Of course, the New Haven people do not intend to perpetuate that ancient absurdity which required trains to be ready to stop at the distant signal. But this Rule 58 raises an interesting query, even if we leave distant signals out of the question. The New Haven has a good many automatic stop signals which have no distants. In time of fog every fast express must come down to about ten or fifteen miles an hour at such signals, must it not? How can such trains make time under such circumstances? These signals all have overlap circuits, we suppose, so that if an engineman runs a train-length too far no harm is done to the train; but the rule must get badly smashed. How many days should a runner be suspended in such a case? And how many times must he "suspend" the rule in a 50-mile run on a foggy morning in order to make his time?

#### The Boston & Albany and the Central.

The most interesting railroad event of last week was the announcement of the agreement by which the Boston & Albany Railroad passes into the ownership and control of the New York Central. The particulars, so far as they have been published, appear in our department of General Railroad News. Of course this great transaction has given rise to a good deal of speculation as to the reasons for the absorption of the Boston & Albany, some writers assuming that it is a speculative transaction for the purpose of selling to the public a lot of securities at a fancy price, and others assuming that it is part of a comprehensive scheme to have a New York Central Railroad from Boston to the Pacific Coast. Neither of these assumptions seems necessary. There appears to be sufficient ground for the transaction on a simple, straight investment basis.

The New York Central & Hudson River Railroad Company is controlled and largely owned by a small group of gentlemen of great fortune who have large sums of money to invest. The Boston & Albany Railroad is a good investment, provided, as a matter of course, that it can be bought at a fair price. It has paid eight per cent. dividends for 23 years and there is no apparent reason why it should not continue to pay those dividends. It runs through a rich and thickly settled country. It serves great manufacturing communities, which must always give it a large passenger business, and also a large freight business, of the class which pays. Its eastern terminus is one of the great cities and seaports of the Union. The physical condition of the property is excellent and the company has the good will of the communities through which the road runs. For all of these reasons and by reason of the conservative management—continued under a well settled, consistent policy for more than forty years—it has long been one of the best railroad properties in the United States, and obviously it must attract people of fortune who want sound, permanent investments.

But the people who own the New York Central & Hudson River Railroad have a sufficient and a powerful motive for making a permanent and irrevocable alliance with the Boston & Albany whether they buy a share of stock or not. They can strengthen their present property by the acquisition of this important trunk line from Albany to Boston and thus give greater stability to both properties. A consolidation will naturally reduce somewhat the general expenses and will reduce a little a few other items of operating expenses. The interchange of traffic back and forth over the two roads may not be any closer or greater in volume than it has been in the past, but the certainty of the continuance of that interchange is worth a good deal. The great rival of the New York Central is the Pennsylvania Railroad, and the Pennsylvania Railroad is liable some time to have close and strong alliances in New England, and it is not amiss for the New York Central to have its own strong New England system. In fact, the New Haven road and the Pennsylvania are already allied, as far as freight and passenger rates are concerned, on such a solid foundation of mutual interest that the Central may for all practical purposes consider them almost as one road. It may be assumed that the New Haven, getting a better eastbound freight business from the Pennsylvania than it does from the Boston & Albany, (with its numerous north and south lines it continues to do a large interchange traffic with the Boston & Albany for and from points west of the Hudson River) already favors the Pennsylvania heavily on westbound; but that does not prove that it would not be able to and actually would take a great deal more away from the New York Central if it owned the Boston & Albany outright. The Central people, therefore, had to consider the contingency not only



that their Boston connection might be bought up by the New Haven, but that it might come completely within the power, if not the possession, of the Pennsylvania itself.

It is a fair presumption that the owners of the New York Central have been for a good while considerably interested in the securities of the Boston & Albany and the new arrangement must naturally raise the value of those securities and so furnish another reason for this arrangement. The Boston & Albany stock becomes now an eight per cent., guaranteed stock, and although it has long been practically a guaranteed stock in virtue of the value of its situation and franchise, it is now before the world with the actual guarantee of a great railroad company. But a guaranteed, eight per cent. stock is a very choice property to own; and so assuming that the owners of the New York Central had considerable holdings in the Boston & Albany before this transaction culminated they have increased the value of those holdings by the transaction. The market price of Boston & Albany stock one year ago was 222; May 1 this year it sold at 258, and last week at 270, showing that investors probably look upon the guarantee as adding to the value of the stock.

It does not seem necessary to go as far as the Pacific Ocean to seek for a reason for the purchase of the Boston & Albany. It may be and it may not be that the New York Central people have in mind an ocean to ocean line, but we may be very sure that they have not lost their heads and that the mere glory of such a scheme will have little to do with working out their policy. As a general proposition it seems reasonable to advise any man to be wary about transcontinental railroads. Most people who own that class of property wish that they had their money in something else. We might apply to Pacific railroads Emerson's saying about land, "no land is bad, but land is worse." It is conceivable, however, that a line from Omaha to the Pacific Coast might be bought at such a price as would make it worth while for the owners of the Boston & Albany, the New York Central and the Chicago & Northwestern to buy that line, but we may be very sure that if they do buy it they will not pay for it any more than it is worth.

#### The Louisville, New Albany & Chicago Receivership.

Railroad corporation lawyers and security holders are greatly interested in the outcome of the suit to set aside the sale of the Louisville, New Albany & Chicago railroad, which will soon again come before the Circuit Court on an order from the United States Supreme Court (May 22) remanding the case. The decision requires the Circuit Court "to inquire whether it is true, as alleged, that the foreclosure proceedings were had in pursuance of an agreement between the bondholders and stockholders to preserve the rights of both and destroy the interests of unsecured creditors; and if it shall appear that such was the agreement between the parties, to refuse to permit the confirmation of sale until the interests of unsecured creditors have been preserved." On the face of this, there appears nothing wrong or unjust, but the opinion of many able corporation lawyers appears to be that the Supreme Court should not have recognized the complainants for the reason that their proceedings were not such as to entitle them to standing in court.

The suit of the complainants is on a claim by the bondholders of the Richmond, Nicholasville, Irvine & Beattyville for recognition of a guarantee, made in 1889, by the then directors of the L. N. A. & C. of bonds of the Beattyville company to the amount of \$1,185,000. The Beattyville bondholders had, prior to August, 1896, been defeated in a number of suits brought to enforce this guarantee, the defense of the L. N. A. & C. being that the guarantee was made by the directors without the assent of the stockholders, as required by the laws of Indiana, and that it was promptly repudiated by the stockholders and the directors deposed. On appeal, however, these decisions were ultimately reversed, and it is alleged by the complainants that the receivership proceedings were had by collusion between the bond and stockholders of the L. N. A. & C. to prevent the Beattyville bondholders from enforcing their claim.

The receivership proceeded nearly to a conclusion without any opposition from these "unsecured creditors." On the day of moving for foreclosure, the Louisville Trust Company, representing the complainants, came into court and petitioned to be made a party to the suit and on the day of the confirmation of the sale it again appeared and filed a petition in the Circuit Court praying that the decree of foreclosure and sale be set aside. The petition was denied by the Circuit Court and on appeal by the Court of Appeals.

The defendants claimed that the complainants did not appear at the proper time and file their petition while the cause was pending, and when the defendants could answer the allegations in proper manner. The dismissal of the petition by the Circuit Court

and by the Court of Appeals shows that these judges were of this opinion.

The courts have heretofore uniformly held, we believe, that while unsecured creditors were entitled to be heard and to receive the full protection of the court, they must come into the case in regular way and so as to afford opportunity for both sides to be heard; and that, all the proceedings having been regular, they could not come in after a decree and sale. In the present case the lower courts appear to have held that the plaintiff came in too late; the case had not been finally closed, but it was practically finished up and the court evidently thought that the plaintiff had purposed to be as late as possible. But the Supreme Court decides that the proceedings of these creditors were regular and that the Circuit Court should have heard them, saying that it believes that under the circumstances as presented by this record that there was an error; that the charge alleged positively, and supported by many circumstances, of collusion between the bondholder and the stockholder . . . was one compelling investigation."

In rendering this decision, moreover, the court goes further and discusses the general application of the law to foreclosures of railroad properties, and indicates that it is of opinion that the law requires that all reorganization plans and proceedings shall be so framed and conducted as to prevent any possible combination of bond and stockholders to impair the rights of unsecured creditors. It appears clear that while the decision cannot affect other reorganizations in which proceedings have terminated and property has passed to other interests without objection, it is likely to cause some change in the hitherto generally pursued plans of railroad lawyers. In future reorganizations they will be likely to proceed very carefully. The opinion was delivered by Justice Brewer, Justice Peckham dissenting.

Mr. Harvey Middleton, General Superintendent of Motive Power of the Baltimore & Ohio, has had his title changed to "Mechanical Superintendent, in Charge of All Shops and the Construction of and Repairs to Locomotives and Cars." David Lee, Engineer of Maintenance of Way West of the Ohio River, will hereafter be Superintendent of Maintenance of Way. We mention these changes in titles chiefly because the note from the press agent announcing them says that General Manager Underwood "has a plan to unify and simplify the titles of Officials." Our compliments to General Manager Underwood, assuming that Mr. Middleton's title is to have two words instead of five. But still his duties and functions will need to be explained by the subtitle until the world agrees as to what a railroad mechanical superintendent has to do. Titles are a constant perplexity. For many years the higher officers have come to place no dependence in titles when they are trying to learn what an officer (on another road) does; subordinate officers and clerks have to put up with whatever was set before them, asking no questions for conscience sake; and railroad newspaper men have done the best they could with a vague nomenclature. No sooner is one arrangement well fixed in the appointment editor's mind than it is supplanted by something different. If we take one prominent road for a model we ought, judging by the past, to find the other roads imitating its example; but if this is true the exceptions continue numerous, and in titles, as in other things, fashion seems bound to keep changing. Whoever will bring forward a nomenclature that shall prove generally acceptable shall have a monument before he dies.

#### NEW PUBLICATIONS.

Performance of Fast Trains in Europe (Le Service Actuel des Trains Rapides); Belgium—England—France—Switzerland. Notes of Travel in 1897-8, by Camille Barbey, Manager of the Yverdon & Ste. Croix Railroad of Switzerland. Published by Georg & Co., Basle and Geneva, 1899.

This is the title of a sumptuous pamphlet of 70 pages, 11 in. x 15 in., which is rich in illustrations of locomotives, passenger cars, trains, and, incidentally, stations, bridges and signals. Mr. Barbey begins with a description of a journey from Bienne to Delemont; the train weighed 180 tons and was hauled by Jura-Simplon mogul locomotives, 2-cylinder compound. Many details are given concerning these machines. The author believes in the superiority of non-automatic starting valves, citing in support of his opinion the specifications for the Northern Pacific 2-cylinder compounds built by the Schenectady Locomotive Works, in which a non-automatic starting valve was required. He also states it as his belief that the 4-cylinder compound is supplanting the 2-cylinder because it more nearly meets the necessities of everyday service. Experience with four-cylinder types in France is held to justify this view.

From Basle to Ostend the train was composed of coaches of the Alsace-Lorraine Railway, having 3 pairs of wheels, and coaches with bogie trucks of the American type like those largely used on the German lines for express service. The locomotive was a 2-cylinder compound built by Henschell & Son of Cassel in 1892, and furnished with an automatic starting valve of the Henschell pattern. The behavior of this engine was like that of the others having automatic

starting gear and gave disagreeable jerks. The maintenance of way in Alsace-Lorraine is described as very excellent and this is ascribed largely to the fact that a strict discipline is made possible by the employment of retired soldiers as District Chiefs. While passing the station at Ghent, Mr. Barbey noticed on a side track an express engine of 3 boilers, built by the St. Leonard Co., in 1889, which has joined company with the "Parisienne," the "James Toleman," the "Rocket" of Heilmann and other epoch-making inventions.

Mr. Barbey speaks in the warmest terms of the British railroads and their "ferruginous" engineers. Every land, he says, save the United States, has been marked with the seal of their practice in every department of design and operation. The author notes that the engines of the South Eastern share with those of the Great Northern the distinction of being the only English engines without domes. The throttling of one of the South Eastern engines was effected by means of the Sterling system, a combination of steam and hydraulic cylinders, which, it is stated, has given entire satisfaction during the eight years of its service.

Mr. Barbey is much struck by the difference in the quality of the engine maintenance in England as compared with the Continent. The locomotives of the Belgian type are described as much cleaner than those of the Northern of France, but dirty compared with the English machines.

From London the "Flying Scotchman" (Eastern route) was taken to Edinburgh. The rolling stock belonged to the Great Northern, North Eastern and North British and composed the most beautiful train that the author saw in England. The presence of what we should call a road foreman of engines, at the station, for the inspection of the locomotive, arouses Mr. Barbey's admiration for English ways. He thinks that a machine which must travel 105 miles at a speed of more than 52 miles an hour without a stop, must require the attention which this official is charged to give it. It strikes us in America as a little odd to be told that there is anything unusual in starting an express train without the tooting of a horn, but that is one of the British practices which our author comments upon.

The signals are remarked upon as being the same on all British lines. "Every stop signal (home signal) is preceded by an advance signal (distant signal)," a statement which, we suspect, ought to be somewhat modified. Mr. Barbey regards British signaling methods as superior in cheapness, simplicity and practicability to those obtaining on the Continent, though he excepts Germany. He speaks favorably of the American plan of right-hand running and the use of semaphores exclusively, with the blades of the "advance" signals green instead of red, as in England. Of the French signaling he has little good to say.

The details of the English and Scotch lines (with which our readers are familiar) are uniformly spoken of in complimentary terms.

Some good speeds are recorded from Calais to Paris. March 19, 1896, train No. 18, weighing 210 tons, covered 185 miles at the rate of 51 miles an hour, and on April 22, 1897, a train weighing 180 tons (17 cars) maintained a speed of 52 miles an hour over the same 185 miles. The author says that the Northern of France now holds the record for speed in Europe "and probably in the world, seeing that the American lines, except for fast runs executed under special conditions, have few trains exceeding 50 miles an hour on journeys of more than 125 miles."

The seven fastest trains in France at the end of 1898 are as follows:

Railroad.	Train.	Speed in miles per hour.
Northern.....	Paris to Calais.....	54.65
Eastern.....	Paris to Nancy.....	48.75
Orleans.....	Southern Express.....	48.44
Midl.....	Paris to Marseilles.....	44.33
Paris-Lyons-Medit'n.....		44.42
Western.....	Paris to Havre.....	45.71
State Railroads.....	Paris to Niort.....	37.57

In Great Britain the three fastest trains are:

Railroad.	Train.	Speed.
Great Western.....	Cornish Express.....	51.54
Two Routes.....	London to Edinburgh ..	50.92

These speeds are computed after deducting all stops and one minute for each acceleration. The distance from Paris to Calais by the shortest route is 185 miles.

In Germany there is but one train approximating 50 miles an hour and that runs from Berlin to Hamburg.

The permanent way is being improved on the Continent. The great lines have definitely adopted rails of from 80 to 100 lbs. per yard, supported on from 15 to 18 cross-ties in a length of about 40 ft., and joined by splices having from 4 to 6 bolts. The metallic cross-ties of the non-German lines are pronounced a failure because of their lack of elasticity, their slight weight and their instability at curves.

The fine speeds realized by the British railroads are ascribed to the excellent quality of their coal, their high standard of maintenance both in way and equipment, and the completeness of their signaling.

In pictures this pamphlet is notable chiefly for its great variety of locomotives, all direct process perspectives from photographs; but there are some views of trains with glimpses of surrounding scenery, and numerous single cars. There are interior



views of the station at York, England, and also of two London stations, Paddington and Euston. The exterior of the station at Bruges, Belgium, is shown.

#### TRADE CATALOGUES.

The Janney Coupler.—The McConway & Torley Co., 48th street and Allegheny Valley Railway, Pittsburgh, Pa., have just issued a very fine illustrated catalogue of the Janney coupler for passenger cars, freight cars and locomotives. The various apparatus made by this company is illustrated in great detail and thus the catalogue becomes a valuable manual. The Janney passenger equipment is first shown in its early and simplest form and then as modified by the Buhoop thrust and connected buffer and also modified for the Janney-Miller combination equipment. Six full page plates are given to these illustrations of couplers, buffers and platforms. Then the Bohoup three-stem passenger equipment is shown in four plates, after which freight car equipment is shown in four plates, and then follows the Janney tender coupler and buffer, which, in various forms, with its details, occupies six full page plates. The pilot coupler, vestibule equipment, narrow gage equipment and miscellaneous equipment takes up 15 more plates. The book ends with an index of details by number and letter and with a five-page general index.

The Baldwin Record of Recent Construction.—Pamphlet No. 13 of the "Record of Recent Construction," published monthly by the Baldwin Locomotive Works, is given up to a collection of 15 plates designed to facilitate calculations involved in locomotive practice. These plates show graphically the revolutions of driving wheels per mile, the elements being the diameter of the curve and the revolutions per mile. Another table gives piston speed in feet per minute at engine speed of 10 miles an hour; another gives nominal horse power required for various grades and speeds; another one gives tractive power per pound of mean effective pressure and others tractive power at 140 lbs., 160 lbs., 180 lbs. and 200 lbs. boiler pressure. Another table gives resistances in pounds per ton for various grades and speeds and another plate gives various curves of speed resistance as deduced from the formulae that have recently been so much discussed. Other charts are of resistance due to acceleration and hauling capacity in tons for each 1,000 lbs. on driving wheels.

The Baltimore Steam Packet Co. (the Old Bay Line), running steamers between Baltimore and Norfolk, has issued its summer excursion book. This line has built a new terminal at Light street, Baltimore, which will be used for outward business, the Union dock being retained for inward freight. This line has been in operation since 1813 and Mr. Walter Ball, the Treasurer, has been in the service of the company over 60 years. The new terminal at Light street is a handsome building sheathed with copper, and the water front is 274 ft. long.

#### Causes of Trains Breaking in Two.

(Continued from page 491.)

Such investigations will at least be a partial guide as to what couplers not to purchase. Trainmen and inspectors should be encouraged to investigate the cause of M. C. B. couplers parting, particularly if the cause is obscure.

8. Many of the couplers on the market need a lock to the lock.

9. Scores of steel knuckles are full of blow-holes, and, of course, do not withstand shocks, especially when coupled to a car equipped with link-and-pin drawbar.

10. Enginemen should be thoroughly instructed as to the handling of brakes, especially where trains are partially equipped with air.

11. Posting the Train-Parted Reports on the bulletin boards has a decided tendency to make the men more careful and reduces the number of break-in-twins. The posting of these reports has created no little interest among the men on the N. C. & S. L. Inspectors, enginemen, firemen and trainmen become familiar with the weak points of the different couplers as well as of the draft rigging, and thus learn to take precautions against danger.

#### The North Bessemer Tunnel.\*

The location of the Pittsburgh, Bessemer & Lake Erie Railroad between the crossing of the Allegheny River and the yards of the Union Railroad in the vicinity of the works of the Carnegie Steel Company, Limited, at Bessemer, Pa., crosses the high elevation of the ridge between the Allegheny and Monongahela Rivers, at a point about four miles southwardly from Verona. The elevation of the normal water level in the Allegheny River on the above line is about 723 government datum and the elevation of the Union Railroad yards at Bessemer is about the same, while between them rises a summit to the elevation of 1,221 feet, or a difference of 498 feet. The con-

struction of the Pittsburgh, Bessemer & Lake Erie Railroad, with a maximum grade, south-bound, of  $\frac{1}{8}$  per 100 feet, or 31 feet per mile, together with the height decided upon for the Allegheny River bridge, necessitated a tunnel through the summit of the ridge traversed.

A double track tunnel was decided upon with the following cross section in the clear, viz.: a semi-circular arch with spring line  $8\frac{1}{2}$  feet above top of rail, radius of arch 13 feet. From spring line to sub-grade the circular face was continued with a radius of 26 feet, to an intersection with the sub-grade line, which line is two feet below top of rail at the intersection with the side line. This sub-grade line descends from the side lines to the center line of the tunnel cross section at which line it is nine inches lower than at the side lines, for the purpose of forming a center ditch or drain for water. The length of the tunnel is 2,900 feet between portals, requiring an approach cut at the north end with a depth of 57 feet at the tunnel portal, and at the south end with a depth of 45 feet at the portal. The grade in tunnel ascending southward is 0.581 per 100 feet for the entire length of the tunnel proper, the summit of the grade between the rivers being in the south approach cut, 900 feet distant from the south portal. The greatest depth from the hill summit to sub-grade in the tunnel is 221 feet at a point 1,200 feet from north portal.

It was the expectation of the railroad company, judging from soundings and from the exposed rock near the south portal, that the character of the material through which the tunnel was to be driven, was such that temporary timber supports only would be required during the progress of the excavation, and that such supports could safely be removed in advance of the erection of the permanent masonry lining; but the opposite was found to be the case, as will be shown later in our narrative. One very important consideration in the construction of this work was the limited time allowed for its completion sufficiently to allow the passage of trains through it. It was to be finished in the fall of 1897, and the first work done upon it, in any way, was the beginning of the excavation of the north approach cut, which was commenced Nov. 30, 1896. Similar work began on the south approach cut Dec. 29, 1896, and in the latter cut there was to be removed a yardage of 58,900, the larger portion of which was hard shale, all requiring blasting, mingled with strata of hard sandstone, the latter of which developed at the portal into a solid ledge about eight feet in thickness, dipping slightly from the horizontal as the excavation proceeded northwardly.

In the north approach cut were 25,600 cubic yards of excavation, largely clay, underlain with soft shale which, upon exposure to the weather, became soft. This latter characteristic occasioned considerable difficulty in its support, not only in the sides of the approach cut, but also during the first 200 feet of the tunnel excavation. After this it hardened. As the winter of 1896-97 was notoriously wet and soft, the removal of sufficient material from the approach cuts to permit access to the work on headings was rather of a formidable proposition under the considerations of bad weather and short time. This condition was not improved by the fact of being obliged to transport the larger portion of the excavated materials from the south approach cut, a distance of nearly two miles, to a large embankment.

The element of time also made necessary at least one shaft, through which two headings could be run, and this shaft was located at a point 1,250 feet from the south portal and the excavation of the shaft was begun Dec. 19, 1896. Ultimately, as the work progressed, with the usual heart-breaking delays and unlooked-for emergencies, a second shaft was found necessary, and it was located 850 feet from the north portal. These shafts were 10 by 20 feet in the clear of excavation, and were lagged and timbered from the top to the crest of the tunnel heading. Shaft No. 2 was begun Feb. 17, 1897. Shaft No. 1 was 129 feet in depth to top of tunnel heading, and shaft No. 2 was 134 feet deep. These shafts were located at such distances from each other as to insure, as nearly as possible, the headings from the portals meeting the headings from the shafts at about the same time that the headings between the shafts should meet. The headings between shaft No. 1 and the south portal met July 29, 1897, and those between the shafts met July 25, 1897, while those between shaft No. 2 and the north heading met July 17, 1897, all of which was rather close and altogether satisfactory as far as the selection of the shaft locations was concerned. The headings in shaft No. 1 were begun Feb. 17, 1897, and in shaft No. 2 on April 22, 1897. The heading at the north portal was begun March 1, 1897, and at the south portal Feb. 19, 1897.

The average distance per working day exclusive of Sundays, that headings were driven was about four feet, the headings from the portals making somewhat better progress than those from the shafts. Compressed air drills were used, the contractors having 24 altogether upon the work. These were the Ingersoll-Sergeant drills, F 24 auxiliary valve,  $3\frac{1}{2}$ -inch cylinders. Their stroke can be made variable, and their work was satisfactory. The compressed

air generating plant consisted of two Ingersoll-Sergeant class A pattern compressors, with steam cylinders 20 x 24 and air cylinders 20 $\frac{1}{4}$  x 24, each with a capacity of 809 cubic feet of free air per minute to a pressure of 100 lbs. per square inch. The compressing plant was located at a point about 1,200 feet north of the north portal, and the air was conveyed in 8-inch main pipe and distributed for use at the different points. The general size of headings was about 8 feet center height by 19 to 21 feet in bottom width, excavated, of course, as nearly semi-circular as possible. The timbering required to support the roof and sides of the headings was furnished in the shape of round timbers in the rough, which were obtained in the vicinity of the work.

The first bench, following the headings, was loaded over chutes into ordinary grading side-dump cars, in the portal headings, and hauled away by small locomotives. In the shaft headings, mining cars were used and the larger part of the material removed through the shafts was lowered down over inclined tracks to the portal cuts and there dumped into the side dumps and moved thence to the points of deposit.

The lower bench in tunnel was blasted loose and loaded into grading cars by the use of steam shovels, the booms of which were shortened to admit of their entrance into the tunnel, and their operation was very successful and satisfactory. It will be readily seen that the use of compressed air in the steam shovels made their use practicable on account of good ventilation and the absence of smoke. This lower bench, which averaged about eight feet high, and practically the entire width of the tunnel excavation, was taken out in 101 working days, or an average of 29 lineal feet per day. The track was laid through the tunnel Sept. 25, 1897, or in less than 10 months from the time the first excavation was begun in the approach cuts.

As previously stated, it was expected that the timbering required to support the roof and sides of the tunnel excavation, until the introduction of the permanent masonry lining, would be but temporary and could be removed, but as the work progressed it was found that the material was so soft and treacherous that close and heavy timbering was required and not removed. This plan was therefore followed, not only to insure safety to the men on account of avoiding caves and falls, but also because it would allow the use of the tunnel by regular trains before the masonry lining should be in place. These timber sets usually consisted of 10 x 10 and 12 x 12 squared posts with a wall plate above at the spring line, and in some places a mud sill below. On the wall plates was set the tunnel center timbering consisting of 9 segments. There were used 623 sets of these timbers, set generally 5 feet centers, excepting in occasional soft places, where they were placed closer. Plank lagging was used back of and overhead of these sets as required.

The original plan called for stone, range masonry lining for the walls from sub-grade up to the spring line of the arch, but inasmuch as the railroad company desired the use of the tunnel as soon as possible, an arrangement was made with the contractors to use a special sized tunnel brick 3 x 4 x 9 in. instead of stone and make the arch of ordinary sized hard burned brick. The cross-section of the bench walls was changed so as to make the back nearly plumb and thus the thickness was materially increased at the bottom, over what was contemplated in the stone work. The arch consisted of six courses of brick. The brick work in the bench walls was started to be laid radially to the circular face of the wall, but the difficulty of keeping the brick from sliding on their beds while being laid, particularly near the base of the walls, where their inclination from the horizontal was the greatest, caused us to allow all brick in the side walls to be laid horizontally, drawing in the face brick in each course to conform to the circle on the face. A thick body of cement was laid along the track side of the walls at the bottom and sloped toward the center of tunnel to prevent water getting under the side walls. The mortar used in the brick work was composed of two parts sand and one part of improved Union cement. Occasional "weep holes" were put into the side walls near the bottom and consisted of clay tiling running through the wall to the backing or filling.

Our specifications called for the arch to be covered with roofing felt or heaviest tarred paper and that, in turn, covered with a cement plaster at least 2 in. thick, all down as low as the spring line and this was carried out as perfectly as possible, but the difficulty of placing this plaster a sufficient distance ahead of the packing to insure its hardening before the stone packing is placed upon it, makes its use of doubtful utility. The spaces between the back of the arch and walls and the sides of the adjacent excavation were thoroughly packed with stone, broken to pass through a 3-in. ring and tamped into place with hammers. There were used 5,792 cu. yds. of this packing and the most of it was quarried from adjacent cuts. The presence of the timbers back of the masonry lining made great care necessary in the placing of this packing. The work of placing the lining was begun in the north end Aug. 12, 1897, and in the south end Oct. 6, 1897, and was completed February, 1898.

\* Paper read before the Engineers' Society of Western Pennsylvania on Tuesday evening, June 20, by F. E. House, General Superintendent of the Pittsburgh, Bessemer & Lake Erie Railroad.



This portion of the work was conducted at a number of points at the same time, the arrangement being that the contractors had the exclusive use of the tunnel at night, the railroad company using it during day time to the exclusion of the contractors' work trains, the contractors, however, doing brick work during the days, not interfering with the passage of the trains of the railroad company. The facades were built of substantial range masonry and thus far no portion of the work shows any sign of weakness.

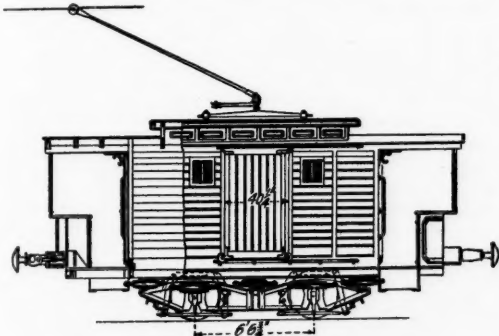
#### Freight Motor Cars.

Some attention has lately been given to the possibilities of using electric lines as feeders to steam railroads, and the following from Germany may be suggestive of how, in special cases, this may be done:

The illustration shows a motor-car in use on the Aibling-Feinbach electric line in Germany for freight service. This line branches off from the main line of the Bavarian state railroad at Aibling station, and is of the standard gage, so that the cars in use on the latter can be switched in on the electric line. The line is about eight English miles long, with a maximum grade of 1.7 per cent., and a minimum curvature of 984 ft. radius. The track is laid with 45 lb. steel rails on cross ties at 33 in. centers.

The freight motor cars are equipped with two motors each, enabling them to haul three of the 15-ton freight cars in use on the state railroads, fully loaded, at a speed of 12½ miles an hour.

These cars have a carrying capacity of 5 tons. They are built on strong channel iron frames, and supported on elliptical springs. The axles are of nickel steel with 3¼ in. journals, and the wheels are steel



Freight Motor Car on a German Electric Road.

tired with wrought iron centers. The cars are equipped with hand brakes only, with a pair of shoes on each wheel. The seven stations on the line are arranged for the accommodation of passengers as well as freight, having besides the waiting room, also a freight office. The stations have telephone connections with the central station.

Except at the terminals, there are no station attendants on regular duty, the receiving and dispatching of freight being attended to by private parties engaged in other business, who act as freight agents only when their services are needed and receive their pay on a commission basis.

The amount of freight handled varies with the seasons of the year, but shows a steady increase. During last year there were handled about 2,500 car loads, among which were 15,000 tons of lumber, 4,500 tons of grain, same amount of brick and about 3,000 tons of coal. Besides the freight transportation, the line maintains a regular passenger service with ordinary motor cars, and carries also the mail.

#### Webb's Three-Cylinder and Four-Cylinder Compounds.

At the engineering conference of the Institution of Civil Engineers, held in London, June 7, Mr. F. W. Webb, of the London & Northwestern, read a paper giving a concise history of the development of the compound locomotive under his direction during the past 20 years. Mr. Webb's design, well known to our readers, provides two outside high-pressure cylinders driving the back pair of wheels, and one inside low-pressure cylinder driving the front wheels, connecting rods thus being dispensed with. An old simple engine was converted into a Mallet compound in 1878 and was run for five years. The first new engine was built in 1881 and was the type of 29 others which have run 15 million miles, or 33,387 miles per engine annually. These engines have cylinders 13 in. and 26 in.x24 in., Joy valve gear and drivers 78 in. in diameter. In running the 15 million miles these engines used 34.2 lbs. of coal per mile per engine, including that used for firing and while standing. Heavier engines being needed, the Dreadnought class was next designed. In this class the cylinders are 14 in. and 30 in.x24 in.; driving wheels 75 in. in diameter; boiler pressure, 175 lbs. per sq. in. Beginning in 1884, 40 of these engines have been built and are now running; total mileage, 18,700,000 (37,206 per engine yearly); average coal consumption, 39.4 lbs.

In 1889 the Teutonic class was designed. These en-

gines are similar to the Dreadnought, but have driving wheels 85 in. in diameter. This engine had a new design of valve gear. Ten engines of this class have been used on fast trains; average coal consumption, 37.9 lbs.

The Greater Britain class was designed in 1891; cylinders, 15 in. and 30 in.x24 in., drivers 85 in. Both pairs of drivers are in front of the firebox and the barrel of the boiler is 18 ft. 6 in. long, with a combustion chamber in the middle. Ten engines of this class have been built; average miles per annum, 54,454; average coal consumption, 38.7 lbs.

In 1893 an eight-coupled freight engine was built, with all the cylinders in a transverse line under the smokebox and all driving onto the same axle. Eighty-one of these engines are now running; average mileage, 28,331 per engine per annum; average coal consumption, 53.4 lbs.

In 1897 the Black Prince was designed. Two of these engines have been built and 18 more are building. They have four cylinders, two high-pressure and two low-pressure; boiler-pressure, 200 lbs.; cylinders, 15 in. and 20.5 in.x24 in., all driving onto one axle. Joy's valve gear is applied to the low-pressure cylinders and the spindles are prolonged through the front of the valve chests and there actuate a lever which works the high-pressure valve. The Black Prince runs through between London and Crewe, 152½ miles, without stopping. Average mileage of two engines, 57,820 per engine per annum; average coal consumption, 40.3 lbs. per mile per engine.

Mr. Webb, after exhaustive experiments, concludes that the saving in fuel by compounding is from 19 to 20 per cent., which conclusion, he says, is confirmed by observations made in the United States.

#### TECHNICAL.

##### Manufacturing and Business.

The Gulf, Beaumont & Kansas City will ask for bids about August or September for 16,000 tons of rails. It is probable that 70-lb. rail will be wanted.

The General Electric Co. has declared a dividend of 1½ per cent., payable July 15.

The Pressed Steel Car Co. has declared a dividend on its preferred stock of 1¼ per cent., payable July 10.

W. J. Carlin, of Pittsburgh, has opened offices in the Lewis Block in that city, where he will continue the business of buying and selling iron and steel plants, rolling mill machinery, steam shovels and general contractors' outfits.

The works of the Falls Hollow Staybolt Co. are in full operation, making safety hollow staybolt iron, both steel and charcoal iron. The company is at present filling an order for two car loads for the Harlan & Hollingsworth Co.

On June 26 the Bethlehem Steel Company formally took over the property of the Bethlehem Iron Company, which latter company has leased its works, etc., to the former company. The officers of the Bethlehem Steel Company are: President, Robert P. Linderman; Vice-President, Edward M. McIlvain; Secretary, Abraham S. Schropp; Treasurer, C. O. Brunner; General Superintendent, R. W. Davenport; Chief Engineer, Owen F. Leibert; Purchasing Agent, Charles P. Coleman.

##### Iron and Steel.

Although the suit brought by Walter R. Kern to restrain the Federal Steel Co. from paying a dividend on its common stock was dismissed the company has been enjoined in another suit brought by F. F. Marquand and Louis Schaeffer. The order signed by Judge Thomas of the United States Circuit Court not only restrains the company from paying a dividend on the common stock, declared June 20, but also from paying any further dividends on either common or preferred stock until the end of the fiscal year in January, 1900.

##### Interlocking.

The Railroad Commissioner of Michigan has authorized the Detroit & Northern to cross the tracks of the Detroit & River St. Clair at New Baltimore and at Marine City. Interlocking signals are to be provided at both places.

##### Foreign Orders for American Bridges.

The New Columbus Bridge Co., of Columbus, O., has recently shipped for the Magdalan & Bogota R.R. Co. of the United States of Colombia, five steel bridges to be used on the line of that railroad. There is one bridge with a span of 120 ft.; two with spans of 100 ft. each, and two of 36 ft. each. The company has also built a number of locomotive turn-tables for the Mexican Central R.R. and at present has work ahead for Havana, Cuba, and San Juan, Porto Rico.

The Berlin Iron Bridge Company is in receipt of a contract for a bridge from the Council of Rangitikei County, New Zealand. The present Chairman, in sending the contract, says that it is the first order of the kind ever sent to the United States, and that a large number of Local Boards are watching the result with great interest, and if this is successful other contracts of a similar nature will be placed in this country. The American pin-connected was adopted on account of the greater ease in erecting.

The bridge is designed for highway traffic, and besides the ordinary travel it is designed to carry a traction engine weighing forty tons. The planking and stringers of the bridge will be of Australian hard wood, known as iron bark. The bridge will be shipped by rail to San Francisco, and from there by steamboat to New Zealand.

##### The Isthmus Canals.

As we have already announced, Read Admiral Walker, U. S. N., has been chosen President of the Isthmus Canal Commission. The organization of the Commission has been carried still further by the assignment of the following committees, namely:

On the Nicaragua Canal Route, Messrs. Noble, Hains and Burr.

On the Panama Route, Messrs. Burr, Morison and Ernst.

On Additional Routes, Messrs. Morison, Hains and Noble.

On the Commercial and Military Value of an Isthmus Canal, Messrs. Johnson, Pascoe and Haupt. On Concessions, Messrs. Pascoe, Johnson and Ernst.

#### THE SCRAP HEAP.

##### Notes.

On the Middle Division of the Pennsylvania Railroad track foremen are now required to take lessons in the art of track laying and maintenance by riding over the division with the supervisor now and then.

The Railroad Commissioners of Iowa have refused to order the Illinois Central to stop its through express trains at Aplington, Butler County, a town of 500 inhabitants. It is held that this place is already accommodated with a train service which is reasonably sufficient for a town of its size. The petitioners alleged that the through trains had stopped at Aplington for many years until within a short time. The report of the inquiry does not state why the stops were discontinued.

Of the 51 freight conductors on the Fall Brook Railway, 41 have received the annual premium of \$60 for a record satisfactory to the Superintendent for the 12 months ending May 31 last. The conductors seem to think that this is the last time they will ever receive this premium, as the road has been absorbed by the New York Central, and such premiums are not paid on any of the other Central lines.

The State Railroad Commissioners of Louisiana have notified the railroads of the State to send in to them annual reports for the year ending June 30. The same notice is sent to express, telegraph and other companies over which the Commissioners have jurisdiction, and all reports are to be filed by Sept. 1. The Commissioners have reduced from \$1,000 to \$250 the fine recently imposed on the Yazoo & Mississippi Valley for failing to stop trains at parish seats.

The Pennsylvania Railroad has bought the Presbyterian church in Altoona, and will fit up the building for a railroad men's library.

The Railroad Commissioners of Massachusetts, on the petition of citizens of Everett, have ordered the Lynn & Boston street railroad to carry passengers through between Everett and Scollay Square, Boston, for five cents each.

Great damage was done by floods in the southern part of Texas last week. Press dispatches say that hundreds of thousands of dollars worth of property has been destroyed, crops being washed away and bridges undermined. The Gulf, Colorado & Santa Fe, the Missouri, Kansas & Texas, the International & Great Northern, the Houston & Texas Central and the San Antonio & Aransas Pass railroads are named as having suffered severely in loss of bridges and damage to roadbeds.

##### Three Years' Improvements on the Baltimore & Ohio.

The long receivership of the Baltimore & Ohio Railroad has now come to an end, and the officers of the road have made up a brief summary of the great amount and variety of work that has been done on the property by the Receivers for the purpose of putting the railroad and its appurtenances in condition to carry a large volume of freight and passenger traffic at a low cost. The Receivers, Messrs. Cowen and Murray, began at the outset to improve the road, equipment and terminals on a large scale, and continued the work vigorously, especially during 1896 and 1897, when, although earnings were low, prices of material and labor were also low.

During their administration the Receivers purchased 15,350 box cars, 6,750 wooden gondola cars, 6,000 pressed steel cars, and 310 miscellaneous freight, postal, express and dining cars, at a total cost of \$17,000,000. The 216 locomotives cost nearly two and one-half millions. The steel rails purchased amounted to 123,010 tons, costing \$2,142,132 (\$17.41 per ton), and there were bought over 3,000,000 cross ties, costing \$1,200,000, and 750,000 cubic yards of ballast amounting to \$525,000. The new steel bridges aggregate in value \$750,000 and fully as much more was spent in improving the several terminals, erecting new buildings, reducing grades and changing alignment. The Maintenance of Way pay-rolls (the amount paid directly to men employed in making improvements on the tracks, etc.), in three years amounted to nearly twelve millions of dollars.

The total amounts to about 35 millions, of which about 15 millions was secured by the issuance of Receivers' certificates and the balance through car trusts, earnings from the property and from the Reorganization Managers. Most of the equipment and rails were bought when material was low in



price and manufacturing concerns were in great need of orders to keep their plants in operation. Steel rails are worth now from \$6 to \$9 a ton more than when the Receivers made their purchases, and locomotives have advanced from \$2,000 to \$3,000 in price. The equipment alone, if purchased to-day, would cost five millions more, and the other improvements one million more.

President Cowen is authority for the statement that the new company intends spending ten millions more in improvements in the next year or two.

#### The Boston South Terminal.

The rolling lift bridge crossing Fort Point Channel at the entrance to the new South Station at Boston is now so far completed that two tracks are ready for use. These tracks will probably be used regularly by the trains of the Plymouth and Midland divisions of the New Haven road within a week. The trains of the Boston & Albany probably will begin to use the new station about the same time.

#### Sixty-Two Miles an Hour on a Bicycle.

On the Long Island Railroad, near Patchogue, N. Y., on Friday, June 30, a man riding a bicycle behind a car drawn by a locomotive traversed a mile in 57½ seconds, a speed nearly twice as fast as has ever been made by a man propelling a bicycle, except on this course and under the methods here pursued. Some days before, the same man, Charles M. Murphy, made a mile in 65 seconds, and the trial of June 30 was to accomplish a mile a minute or better.

In preparation for this test a plank floor was laid between the rails of the track on a straight and level stretch of about two miles, and the measured course was in the middle of the two-mile section. The bicycle rider started with the train and kept very close to the rear buffer of the car the whole of the way. The buffer was covered with rubber, to soften the shock in case the rider should run against the car. The chief peculiarity in this test was the use of a wind shield built out from the rear of the car, so that Murphy rode practically in almost still air. The shield covered the top and the sides of the space and extended out about six or eight feet. The current of air produced by the movement of the train was therefore an important element in the speed made by the bicycle rider, and during the first trial the observers on the car said that his head was within four inches of the buffer of the car throughout the measured mile. After passing the finish the locomotive runner increased his speed and Murphy slackened, and he had considerable difficulty in keeping his balance, being greatly disturbed by the irregular air currents. While he was keeping up his speed and was close to the car buffer he had no difficulty. On the final trial Murphy was lifted up to the car platform by two men as soon as the mile was finished, and then his wheel was taken up.

#### Electricity on the C. M. & St. P.

The ordinance providing for the change of motive power from steam to electricity on the Evanston Division of the Chicago, Milwaukee & St. Paul was recommended for passage, after the compensation clause was changed to read \$5,000 a year for 20 years, instead of \$5,000 in all. This provision, it is announced, will not be accepted by the road, as it is said it would bankrupt the Evanston Division. The matter therefore remains unsettled.

#### National Export Exposition.

An exhibition at Philadelphia in the interests of export trade will be opened Sept. 14 and close Nov. 30 next. The floor space in the main building will cover 12 acres. It will be 1,000 ft. x 400 ft. The power house will be built of stone 58 ft. x 190 ft., and be situated on the Schuylkill River side of the grounds between the central and southern pavilions of the main building. The transportation building will be 450 ft. in length and 150 ft. wide. In the space back of the main building and the broad avenue between the transportation and agricultural exhibit halls, will be a building containing among other things a track for exhibiting horseless carriages. Among other plans in connection with the buildings is an auditorium in the main building with a seating capacity of 5,000. In this auditorium the sessions of the International Commercial Congress will be held and concerts will be given in the afternoons and evenings.

#### Ice Plant for Manila.

Contract for the refrigerating plant for Manila previously noted in this column, has been let to the De La Vergne Refrigerating Co., of New York and Chicago. The specifications require that the ice and refrigerating plant shall be erected in Manila within nine months, the total cost to be \$500,000.

#### Chicago Paving and Sewers

Bids are asked this week for paving parts of 27 streets, or about 15 miles in all. The estimated cost is \$600,000. The paving to be used is principally asphalt, brick and macadam, only a small amount of cedar and granite being included.

#### South Side Elevated, Chicago.

An agreement has been made between the City and the Trustees of the Sanitary District for the extension of the South Side intercepting sewer system along the lines noted in our issue of June 9. The city is to build the sewers and a new pumping station near Seventy-fifth St. and Stony Island Ave., and the Drainage Board is to maintain the proposed pumping station until Jan. 1, 1905.

The South Side Elevated in June carried altogether 1,683,510 passengers, an average of 56,117 a day, an increase of 10,690 compared with July, 1898. The percentage of gain over corresponding months last year shows a steady gain.

#### Electric Railroad Notes.

Work is being pushed on the temporary trolley line for the Chicago City Ry. on State St., which was noted last week, and it will probably be in use this week. The Union Loop Co. has obtained a temporary injunction in the Superior Court against the Chicago City Ry., which will prevent that road from attaching its trolley wires to the loop structure, which the Loop Co. claims that the surface line proposed to do along Wabash Ave., which it says will endanger the lives of pedestrians and passengers on the elevated structure, and it asks that the injunction be made permanent.

At a meeting, June 30, of the stockholders of the Chicago Union Traction Company, the following officers were elected: President, Jesse Spalding; General Counsel, Henry Crawford, Philadelphia; General Manager, John M. Roach; Directors, William L. Elkins, Philadelphia; P. A. B. Widener, Philadelphia; Thomas F. Ryan, New York; C. K. J. Billings, Clarence Buckingham, Charles L. Hutchinson, William

Dickinson, Walter Wilson and Jesse Spalding, Chicago. On July 1 the North Chicago and the West Chicago street railroads were formally transferred to the Chicago Union Traction Co. Jesse Spalding, the President of the new company, in his first order announced that the Board of Directors had elected the following officers: R. A. C. Smith, Vice-President, in New York; Walter H. Wilson, Vice-President; J. M. Roach, General Manager; James H. Eckels, Treasurer; L. S. Owsley, Assistant Treasurer; J. C. Moore, Secretary; F. E. Smith, Auditor. All employees and agents are to continue to discharge their present duties until further notice.

The Washington & Gettysburg Ry. Co., George H. Harries, President, has been granted authority by the District Commissioners to issue bonds not in excess of \$275,000, to cover the cost of building and equipping the road within the limits of the District of Columbia. The estimates of cost submitted to the Commissioners are \$40,000 for rights of way and site for the power station, \$46,000 for the power station buildings, \$44,000 for engines and boilers, \$22,000 for generators, \$3,000 for switchboards, \$8,000 for piping, \$15,000 for excavation and street work, \$50,000 for rails, ballast and labor; \$15,000 for overhead work, \$15,000 for equipment, \$5,000 for salaries and expenses, \$5,000 for electric lighting plant, \$2,000 for surveys, and \$5,000 for incidentals.

Five million dollars of the authorized capital stock of the Metropolitan St. Ry. Co., N. Y., is offered for subscription to the stockholders at par.

Electric cars were run half-hourly over the Fifth Ave. branch of the Brooklyn Elevated Railroad July 3 for the first time by the third-rail system. Three trains, each consisting of a motor-car and two trailers, were in use. These run between the steam trains. When the line is equipped to Coney Island, and through service is put in, the steam trains will be gradually discontinued until nothing but electric trains will run.

#### Technical Schools.

State Agricultural College of Kansas, Manhattan, Kan.—An extension to the machine shops for which the last Legislature appropriated \$16,000, will be built this summer and completed by Oct. 1. The bids are now being received by the Regents. The new buildings will include blacksmith shop, foundry, testing laboratory, steam fitting shop, brass foundry and an additional machine shop. Room will be provided for 300 additional students.

#### LOCOMOTIVE BUILDING.

The Chicago & West Michigan has ordered two locomotive boilers from the Schenectady Locomotive Works.

It is stated that the Intercolonial of Canada contemplates buying a large number of locomotives. We have no official information.

U. S. Consul Skinner writes to the Department of State from Marseilles, France, under date of June 8, as follows: "I learn to-day from Tunis that the Compagnie des Phosphates et du Chemin de Fer de Gafsa, a corporation engaged in extensive enterprises in that protectorate, is in the market for all sorts of rolling stock, including locomotives, and that proposals have already been invited in England. I think that it is not too late for American manufacturers to compete for this order if prompt action is taken. The address of the company is 60 Rue de la Victoire, Paris, and for cabling purposes it may be addressed as the 'Compagnie Gafsa.'"

#### CAR BUILDING.

The Southern is getting bids on one observation and buffet car.

The Houston, East & West Texas will build 50 more flat cars at its Houston shops.

It is stated that the Southern Pacific will build at its Sacramento shops 300 flat cars, to be 36 ft. long.

It is reported that the Intercolonial of Canada will increase its passenger and freight car equipment. We have no official information.

The Pressed Steel Car Co. has received from the Rio Grande Western a sample order for 25 steel cars of 100,000 lbs. capacity. They are for August delivery.

We understand that while the order for 12 coaches for the Chicago, Burlington & Quincy, previously noted, has not been formally closed, it will be given to Pullman's Palace Car Co.

The White Pass & Yukon (Pacific & Arctic Ry. & Navigation Co.) has just turned out two stock cars, 33 ft. 6 in. long, and eight more are under way. The shops of the road are at Skagway and are in charge of Division Superintendent F. H. Whiting.

The 500 coal cars of 80,000 lbs. capacity ordered on June 24 by the Louisville, Evansville & St. Louis Consolidated from Pullman's Palace Car Co., and noted last week, are for October delivery and will measure 36 ft. 6 in. long, 10 ft. wide and 8 ft. high, and weigh about 30,000 lbs. The cars will be equipped with Shackle, Harrison & Howard couplers and bolsters, steel axles (Pennsylvania specifications), Sterlingsworth brakebeams, cast-iron brake shoes, Westinghouse air brakes, Fulton brasses, Thornburgh draft rigging, McCord journal boxes and lids and cast-iron wheels.

#### BRIDGE BUILDING.

AUGUSTA, GA.—The Southern Ry., according to report, will do away with the old South Carolina & Georgia railroad bridge over the Savannah River and build a new structure.

BARKER, N. Y.—It has been voted to replace the old wooden bridge across the Chenango River at Chenango Forks with an iron structure to cost about \$10,000. (March 31, p. 223.) Address David B. King, Supervisor, Chenango Forks.

BEMIS, MASS.—Reports state that the following were the bids received for the bridge across the Charles River: R. D. Shanahan, \$6,300; Ross & Fowler, \$6,350; Norcross Bros., \$7,742; Holbrook, Cabot & Daly, \$7,780; A. B. Murdough, \$8,592; Trumbull & Co., \$10,741, and Harries & Letteney, \$17,900.

BENNING, D. C.—The contract for the stone work on the three bridges for the Columbia Ry. Co., of Washington, has been let to Albert Weber, of Baltimore, Md.

BERLIN, ONT.—Tenders, according to report, will soon be wanted for the erection of a steel bridge in the village of New Hamburg. Herbert J. Bowman, C. E.

BILLING'S BRIDGE, ONT.—The Township authorities are asking tenders for a bridge over Finley's Creek, according to report.

BILOXI, MISS.—No bids were received for the \$15,000 5 per cent. 20-year bridge bonds. (May 26, p. 377.)

BIRMINGHAM, O.—The proposed \$16,000 bridge over the Vermillion River, which is to be about 470 ft. long, it is said will not be built this season, as all bids recently received were in excess of the appropriation. (April 21, p. 286.)

BLOOMFIELD, IND.—Bids are wanted by July 15 on the abutments for the bridge across Indian Creek in Jackson Township. Address Stephen E. Anderson, Chairman of the Commissioners of Greene County.

BOSTON, MASS.—The City Treasurer last week received proposals for bonds, part of which will be used for the Charlestown, the Cambridge and the Malden bridges.

BRANDON, MANITOBA.—Mr. Millican, C. E., of the Provincial Public Works Department, is surveying for certain proposed works, including two bridges over the Assiniboine River. Mr. Dancer, C. E., of the same department, is making surveys for proposed roads and bridges in the Kildonion District.

BREWTON, ALA.—Bids, with plans and specifications, are wanted July 17, for two of the proposed iron bridges over the Conecuh River. Wm. J. Jackson, County Treasurer, Escambia County. N. R. Leigh, Judge of Probate. (March 10, p. 177.)

BROCKVILLE, ONT.—A new bridge over the Rideau River will be built by the municipality of Augusta, in Augusta Township.

BURLINGTON, VT.—Reports state that the Heineberg bridge will be repaired at an estimated cost of \$4,000. It is stated that a new bridge could be built for \$10,000. The city of Burlington and the town of Colchester will pay one-fifth of the total expense.

BURT, IA.—We are informed that the County Board of Kossuth County will receive proposals July 28 for an iron bridge 100 ft. long, to be built on steel piers, across the East Fork of the Des Moines River. Address C. A. Teller, Civil Engineer and Surveyor, Algon, Ia.

CAMBRIDGE, MASS.—Bonds were disposed of last week to the extent of \$50,000 for new bridge work.

CAMDEN, N. J.—Bids are wanted July 12 by County Engineer J. J. Elbertson for the construction of a one-span steel highway bridge 400 ft. long over Penshankin Creek, between Camden and Burlington counties on Park Ave.

CAPE MAY, N. J.—The Cape May County Board of Freeholders, reports state, have awarded the contract for building a new steel bridge over Cape Island Creek, Schellenger's Landing, to F. R. Long, of New York, the price being \$5,950. The new bridge will contain a draw.

CHERAW, S. C.—Bonds for \$10,000, bearing 6 per cent., were sold last week, for new bridge work, according to report.

CHICAGO, ILL.—At a conference between Commissioner of Public Works McGann and other city officials and representatives of the Chicago, Burlington & Quincy, the Chicago & Northwestern and the Chicago Terminal Transfer Co., the roads interested agreed to repair and maintain the Halsted St., Blue Island and Center Ave. viaducts over their tracks, which were condemned by the city, and to bear \$27,000 of the \$46,000 of expense for rebuilding the viaduct at Canal St. Inspection of viaducts by the City Engineer recently showed that six viaducts carrying heavy traffic had been so injured by the fumes from passing locomotives and neglect to paint them, as to be dangerous, and some were ordered closed to all traffic except pedestrians. It is said that \$2,000,000 will be required to put the viaducts of the city in safe condition.

CLINTON, IND.—Bids are wanted, according to report, by July 17, for a steel bridge across the Wabash River, which is estimated to cost \$40,000. C. M. White is Mayor of Clinton.

COMMERCE, MISS.—Bids, according to report, will probably be wanted very soon for the three-span bridge over Indian Creek on Commerce Road between this place and Robinsonville.

CORPUS CHRISTI, TEX.—We are informed that the plans to build a bridge over the Neuces River near this place have been indefinitely postponed by the Commissioners' Court.

COUNCIL BLUFFS, IA.—A proposed bridge in Fairmount Park is estimated to cost \$1,500. It will probably be of a 90-ft. span, with 18 ft. roadway, on concrete piers.

DALLAS, TEX.—Dispatches from this city state that the flood on July 4 in the Brazos Valley destroyed a large steel bridge of the Missouri, Kansas & Texas Ry. over the Brazos River, at a place called Dewey Station.

DE PERE, WIS.—Bids will be received at the office of the Town Clerk July 8 for a steel bridge across East River on the Jordan road. Anton Vanderhelden and John Quatose, Committee on the part of the County.

EFFINGHAM, ILL.—The Commissioners of Highways of Douglass Township and the County Committee will receive bids July 15 for a steel bridge 75 ft. long over Green Creek. Address J. B. Jones, County Surveyor.

EUREKA, CAL.—A bridge 250 ft. long is said to be under consideration by the County Commissioners to cross Mad River at Hannah's Crossing, estimated to cost \$4,000.

EVANSVILLE, IND.—Louis H. Legler, Auditor of Vanderburg County, informs us that the bids received June 22 for the ten county bridges to be built this summer were: Bids for the bridge abutments—Wm. H. Isaacs, \$1,193; James D. Saunders, \$1,350;



Jacob P. Welkel, \$1,588; contract awarded to Wm. H. Isaacs. Bid for the superstructure of the ten iron bridges: Canton Bridge Co., \$9,999; Indianapolis Bridge & Iron Co., \$9,700; W. A. Braden, \$9,567; New Columbus Bridge Co., \$9,747; Massillon Bridge Co., \$9,250; Brackett Bridge Co., \$9,998; contracts awarded to Massillon Bridge Co.

FERGUS, ONT.—The County Council will build steel bridges at Fergus and Bosworth, costing about \$2,000 each.

FLORENCE, ORE.—The County Commissioners, according to report, have made a contract with G. H. Colter and C. E. Harwood to build a bridge across Fiddle Creek, on the road connecting Glenada and Gardiner. The bridge will be built on piling, and including the approaches will be 630 ft. long.

FREDERICKSBURG, ONT.—Plans have been prepared, according to report, for a steel bridge to replace the wooden structure known as Forshee's bridge.

GALENA, ILL.—The Jo Daviess County Bridge Committee, in conjunction with the Commissioners of Highways of Guilford Township, will receive bids until July 15, at 10 A. M., for building two new iron bridges in the township of Guilford, Jo Daviess County. The first bridge to be at Thatcher's Crossing is to be of one span 30 ft. Second bridge, at Distler's Crossing, is to be of one span 40 ft., both on stone abutments. Both bridges are to have a driveway of 12 ft., and a capacity of not less than 100 lbs. to the sq. ft. Albert Dittmer, A. W. Bethel, W. W. White, County Bridge Committee, may be addressed.

GATINEAU POINT, QUE.—Reports state that the plan for building a bridge between Hull and Gatineau Point, over the Ottawa River, are about settled. The present damaged structure was built seven years ago at a cost of \$40,000.

GENOA, NEB.—The Canton Bridge Co., according to report, has the contract for a steel bridge over Beaver Creek at \$1,192. (June 2, p. 392.)

HAINES, ALASKA.—A bridge will probably be built across the Chilkatt River near or at Indestucka, according to report.

HARTFORD, CONN.—According to report, a bridge will be built over the railroad tracks at Park St.

HOLLIDAYSBURG, PA.—Judge Bell, of Blais County, is reported as protesting against unnecessary bridge building by the County Commissioners. Last year the county expended \$27,032 for bridges, and the court holds that this was too much, and that the law imposes no obligation upon the county to build bridges over rivulets and creeks where the construction can be done by Townships and Boroughs.

HOUSTON, TEX.—About three miles of wooden trestle and bridge work of the same character will be necessary on the extension of the Gulf, Beaumont & Kansas City. This work will later be substituted by steel. John H. Kirby, General Manager.

HULL, QUE.—The City Council, according to report, has offered H. J. Beemer a bonus of \$30,000 toward the Interprovincial bridge, between this place and Ottawa, Ont.

INDIANAPOLIS, IND.—Reports state that the County Commissioners have decided to build a bridge over Fall Creek at Central Ave. It will probably be an iron structure.

KAUKAUNA, WIS.—Reports state that the high water of the Fox River carried out the flume of the Kaukauna Electric Light Co. on the Green Bay & Mississippi Canal and with it two railroad bridges on the Chicago & Northwestern, and also a turn-pike bridge. F. J. Harriman, Surveyor Ontagamie County, Appleton.

LAJUNTA, COL.—Bids are wanted, with plans and specifications, by July 15, for the bridge over the Arkansas River near this place. Address A. J. McCune, State Engineer, Denver.

LEESBURG, VA.—Reports state that the Wrought Iron Bridge Co., whose bid was \$1,097, got the contract for the iron bridge across Kittoctin Creek. The contract for the masonry work was awarded to Chas. Stunkle, of Belmont, at \$3.35 per cu. yd.

LONDONBORO, ONT.—The Hullett Council has decided to build a steel bridge with stone or concrete abutments, on the base line near Govier's. The Council is also considering the advisability of building a new bridge over the Maitland River.

MANSFIELD, ILL.—The Town Clerk on July 10, at 1 P. M., will let the contract for constructing a 60 x 16 ft. steel highway bridge on 127 cu. yds. of stone masonry. Certified check for \$100 is required with bids. Plans and specifications may be had of Charles Gordon, Clerk, Mansfield, Ill.

MARSHALL, MICH.—The city will build a new bridge across the Kalamazoo River on Marshall Ave. It is undecided whether it will be iron or stone.

MONTICELLO, MO.—The Massillon Bridge Co., we are informed, has secured the contract for the 170 ft. bridge at \$3,098; James Chinchin has the contract to rebuild the abutments at \$550; R. Phillips, of St. Louis, Mo., has the contract for the 128 ft. span at \$1,852, and J. T. Garrett, of St. Louis, has the contract for the 42 ft. span bridge. (June 23, p. 45.)

NATCHITOCHES, LA.—D. C. Scarborough, President of the Natchitoches Ry. & Construction Co., informs us regarding the bridge proposed by his company. The bridge will probably be located at Grand Ecure, on the Red River, four miles north of Natchitoches, in the Parish of Natchitoches. This bridge is to be built for the Natchitoches Ry. & Construction Company, incorporated under the laws of Louisiana, with a capital stock of \$300,000, and is to be a railroad and traffic bridge. The plans and specifications will be prepared in accordance with the rules and specifications for building bridges generally adopted by the Texas & Pacific Ry. It is not known at present just how long the bridge will be, but it is to be built and completed in the next eighteen months or two years. The total estimated cost will be not less than \$125,000. (June 30, p. 480.)

NEW CASTLE, IND.—Following are the bids reported received by the County Commissioners for the construction of four bridges and two arches: The lowest figures were by the New Castle Bridge

Company, which was awarded the contracts. The bids were as follows:

Oregonia Bridge Co.—No. 1, 50 x 14 ft., \$1,050; No. 2, 50 x 14 ft., \$1,099; No. 3, 60 x 14 ft., \$1,210; No. 4, 20 x 14 ft., \$350; No. 5, arch, 30 x 8 x 5, \$426; No. 6, arch, 27 x 8 x 5, \$280. Total, \$4,415.

Vincennes Bridge Co.—All the bridges and arches as per specifications, \$4,300.

Charles S. Yerkes.—All the bridges and arches as per specifications, \$4,360.

The New Castle Bridge Co.—No. 1, 50 x 14 ft., \$995; No. 2, 50 x 14 ft., \$980; No. 3, 60 x 14 ft., \$1,070; No. 4, 20 x 14 ft., \$319; No. 5, arch, 34 x 8 x 5 ft., \$375; No. 6, arch, 27 x 8 x 5 ft., \$225. Total, \$3,964.

NEW RICHMOND, WIS.—The County Board, at a meeting in Hudson, June 27, voted to rebuild the bridge at New Richmond at a cost not to exceed \$5,000. (June 30, p. 480.)

NORWOOD, PA.—It is said that a foot bridge will be built over the P., W. & B. RR. tracks at Winonah Ave.

ORILLIA, WASH.—Bids were opened in Seattle June 24 by the County Commissioners for the construction of a steel bridge in the White River valley. The bids were all higher than expected. The bids are: Puget Sound Dredging Co., \$12,980; Savage & Scofield, \$13,140; Northwest Bridge Co., \$13,270; Seattle Bridge Co., \$13,480; Van Norman Bridge Co., \$13,600; Pacific Bridge Co., \$14,000; Robert Wakefield, \$14,840; Smith & Howard, \$15,375. (June 16, p. 437.)

PATERSON, N. J.—The County Board of Freeholders of Passaic County, according to report, will consult with the Erie RR., with a view to removing the grade crossings, one in particular on Clinton Ave. At a meeting of the Board of Freeholders, June 27, it was decided to erect a steel arch bridge over the Passaic River at the end of Main St., to cost \$60,000.

PEMBROKE, ONT.—The Council has finally decided to build an iron bridge over Mary St., and a by-law has been prepared to provide funds for the purpose. (May 5, p. 321.)

PHILADELPHIA, PA.—Regarding the abolition of grade crossings on the line of the Philadelphia & Trenton RR., we are informed that the ordinance of the Councils authorizing the abolishment of these grade crossings authorized the Pennsylvania Railroad Company, lessee of the P. & T., to do all the work incident to the construction of bridges and the elevation of the tracks.

PLACERVILLE, CAL.—Reports state that J. L. Maude, State Highway Commissioner, has decided to have the existing wooden bridges on the Lake Tahoe wagon road from here to the Lake replaced by permanent stone structures. About \$20,000 will be spent.

PLYMOUTH, MASS.—We are informed that Ross & Fowler, of Boston, received the contract at \$3,950 for the bridge, about 224 ft. long, at Scituate.

PULASKI CITY, VA.—We are informed that the bridge proposal over New River by Pulaski County will probably be of iron or steel and about 550 ft. long. It will be of three spans of 150 ft., with 50 ft. approaches and 16 ft. roadway. (June 23, p. 459.)

QUEBEC, QUE.—The contract for the superstructure of all the bridges east of Joliette on the Great Northern Ry. of Canada, has been given to the Dominion Bridge Company, while the Hamilton Bridge Company has those on the Western section, which includes the heavy structure over the Ottawa River. This bridge will have seven spans of 210 ft. each, together with a quarter of a mile of trestle work. The Bayonne bridge at St. Elizabeth will have a span of 100 ft., and the Chicot River will be crossed by a steel trestle 300 ft. long. The Maskinonge River will be crossed by a bridge of 100 ft. span, while there will also be a steel trestle in connection with this bridge, 1,000 ft. in length and 170 ft. high. The River du Loup will require 800 ft. of steel trestle at a height of 150 ft., and the east and west branches of the Yamachiche River bridge will also have steel trestles, the east 500 ft. and the west 300 ft. long.

REDWOOD CITY, CAL.—It is reported that an electric railroad will build a \$12,000 bridge on the proposed road.

RIPLEY, O.—Bids are wanted, according to report, on a county bridge by July 14, by H. L. Hennings, County Auditor.

ROCK FALLS, ILL.—Bids have been advertised for to build a 22 ft. steel bridge on the Prophets-town road, where it crosses Spring Slough.

SAN JOSE, CAL.—Recent reports state that a new wooden bridge to cost \$2,000 may be built over the Coyote Creek on Julian St., to replace the present condemned structure. (June 23, p. 459.)

SONORA, CAL.—W. Frank Drake, a correspondent to the Sonora "Independent," writes to that paper that the bridge across the north fork must be built soon, and that several of the mining companies will divide the expense. It will be in the vicinity of the Lost Fox group of mines, East Belt. P. J. Kerrigan is Superintendent of the mine.

SPRINGFIELD, MASS.—Reports state that plans have been prepared by the City Engineer for the proposed bridge over the tracks of the New England RR. on St. James Ave. (March 24, p. 216.)

SYRACUSE, N. Y.—The City Clerk has been directed to secure proposals for the stone abutments and for building the bridge over Onondaga Creek at Rich St. (March 3, p. 159.)

TALLADEGA, ALA.—Eugene Zimmerman, of Cincinnati, O., Vice-President of the C. H. D., who recently bought the Birmingham & Atlantic RR., it is said, will rebuild the railroad bridge across the Coosa River. The present bridge has been condemned by the State Railroad Commission.

TOLEDO, O.—City Engineer Brown, according to report, has prepared plans and specifications for a foot-bridge to be attached to the Wheeling railroad bridge across the river at this place, at the estimated cost of \$6,000.

VERNON, ILL.—The County Board of Lake County, we are informed, are considering an overhead truss bridge, about 160 ft. long, across the Des Plaines River in the town of Vernon, at an estimated cost of \$4,000. Address James Anderson, Jr., County Surveyor.

VICTORIA, B. C.—Application has been made for permission to erect a bridge with a suitable span across the Upper Columbia River, near Salmon Beds.

WASHINGTON, D. C.—The Citizens' Northwest Suburban Association, at a recent meeting, decided to ask an appropriation of \$250,000 for the completion of the Rock Creek bridge on Connecticut Ave. extension.

WAYCROSS, GA.—The County Commissioners of Ware County are reported to have made measurement of the bridges contemplated across Kettle Creek. One at the crossing of a new road is 550 ft., and another is 300 ft. The matter was to come up at the July 1st meeting of the Board. (March 31, p. 233.)

WEST SPRINGFIELD, MASS.—At a meeting of the Selectmen of West Springfield and Agawam, it was decided to change the plans for the bridge over the Agawam River to a high truss bridge. Bids will be wanted on such a structure Monday, July 10. (June 30, p. 480.)

WILMINGTON, DEL.—The New Castle County Levy Court July 2 awarded Patrick Fahey, of Wilmington, the contract to build a bridge 40 ft. wide across the Brandywine Creek, at Seventh St. The structure will cost \$25,000. (June 30, p. 480.)

#### Other Structures.

ALLEGHENY, PA.—The Buffalo, Rochester & Pittsburgh, according to report, will build a new freight depot at Balkham and Darragh Sts. An Allegheny firm is said to have the contract to clear the ground for the new building.

The Pennsylvania Car Wheel Works Co., it is said, will make extensions to its plant and equipment, involving at expenditure of \$100,000.

ANNAPOLIS, MD.—The site for the new post-office at Annapolis has been selected and the ground ordered bought.

BALTIMORE, MD.—O'Neil & Co. will build a six-story brick, stone and iron building at Charles and Lexington Sts., to cost \$63,000.

BIRMINGHAM, ALA.—The Birmingham Machine & Foundry Co., whose plant was recently destroyed by fire, it is said will soon rebuild.

Miles & Bradt, of Atlanta, according to report, have the contract, at \$40,000, for the steel work of a new building on Second Ave., near 20th St., Birmingham, to be used by Drenner & Co.

BUTTE, MONT.—The new post-office building at Butte, it is said, will be located at Main and Copper Sts. The appropriation for the building will be \$200,000.

CAMBRIDGE, MASS.—The City Treasurer on June 27 received bids for \$154,000 of bonds, part of the proceeds of which will be used for new schools and part for bridge work.

DES MOINES, IA.—E. W. Crellin of Des Moines has the contract for the iron work for the new library building, at \$11,945.

GLENS FALLS, N. Y.—Contracts, according to report, have been let by the Delaware & Hudson for a freight house to cost about \$7,000, to be built at this place.

LANSING, MICH.—The Masons, according to report, have organized a building association and will put up a \$20,000 temple.

LITTLE ROCK, ARK.—George R. Mann is the architect for the State Capitol which will be built at Little Rock and cost about \$1,000,000.

MONTREAL, QUE.—The Montreal St. Ry. Co., according to report, will build three large car barns on St. Dennis St., and will also require several miles of new rail for an extension.

MOUNT MORRIS, N. Y.—A special town meeting will soon be held to vote on a proposition to issue \$30,000 for a new steel dam in the Genesee River.

NEW YORK, N. Y.—Reports state that a steel manufacturing plant will be built in Astoria, and that James M. Waterbury of 69 South St. is interested.

The Protestant Dutch Church of the City of New York, West End Ave. and 77th St., will place new arches in the building at a cost of \$1,000. E. K. Bourne, builder.

New steel beams will be placed in the building No. 705 Fifth Ave. The cost will be \$3,000.

PHILADELPHIA, PA.—The Baldwin Locomotive Works, it is said, will tear down the present building at Sixteenth and Buttonwood Sts. and erect on the site a building 80 x 160 ft., four stories, brick and iron.

RAT PORTAGE, ONT.—The Canadian Pacific Ry. will build a commodious depot at this place, according to report.

RICHMOND, VA.—We are informed that arrangements have been reached between the Chesapeake & Ohio and the Seaboard Air Line for the building of the new union station at Richmond. Reports state that Frank P. Milburn of Charlotte, N. C., is the architect for the new structure.

TRENTON, N. J.—George E. Poole, Jr., Prudential Bldg., Newark, N. J., will prepare plans for the enlargement of the State Capitol.

WINNIPEG, MAN.—It is reported that the estimated cost of the proposed Canadian Pacific hotel to be erected in Winnipeg is \$800,000. It is officially announced that the Northern Pacific Company will not rebuild the Manitoba Hotel on account of the uncertainty of securing Government assistance in extending its line westward from Portage la Prairie.

#### MEETINGS AND ANNOUNCEMENTS.

##### Dividends.

Atlantic Coast Line.—Semi-annual, 3 per cent., payable July 3.  
Burlington, Cedar Rapids & Northern.—Semi-annual, 2 per cent., and 2 per cent. extra, payable Aug. 1.  
Delaware, Lackawanna & Western.—Quarterly, 1 1/4 per cent., payable July 20.  
Des Moines & Fort Dodge.—Annual, 7 per cent.  
Pennsylvania & Northern.—Semi-annual, 2 per cent., payable July 10.



Philadelphia & Camden Ferry Co.—Semi-annual, 5 per cent., payable July 10.  
 Providence & Worcester.—Quarterly, \$2.50 per share.

Philadelphia Passenger Ry.—Dividend \$1.50 declared, payable July 7.  
 Scranton & Carbondale Traction.—One per cent., payable July 1.

Meetings and conventions of railroad associations and technical societies will be held as follows:

American Association of General Passenger and Ticket Agents.—The annual convention will be held at Boston, Mass., Oct. 17.

American Society of Civil Engineers.—Meets at the house of the Society, 220 West Fifty-seventh street, New York, on the first and third Wednesdays in each month, at 8 p. m.

American Society of Railway Superintendents.—The annual convention will be held at Detroit, Mich., beginning Sept. 20. C. A. Hammond, Secretary, Asbury Park, N. J.

American Street Railway Association and Street Railway Accountants' Association of America.—The annual convention is set for Oct. 17, at Chicago, Ill. T. C. Pennington, Secretary, 2020 State St., Chicago.

Association of Engineers of Virginia.—Holds its formal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building, Roanoke, at 5 p. m.

Association of Railway Superintendents of Bridges & Buildings.—The annual convention will be held Oct. 17, in Detroit, Mich. S. F. Patterson, Secretary, Concord, N. H.

Boston Society of Civil Engineers.—Meets at 715 Tremont Temple, Boston, on the third Wednesday in each month at 7.30 p. m.

Canadian Roadmasters' Association.—The annual convention will be held at Toronto, Sept. 20. J. Drinkwater, Secretary, Winchester, Ont.

Canadian Society of Civil Engineers.—Meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.

Central Railway Club.—Meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

Chicago Electrical Association.—Meets at Room 1737, Monadnock Building, Chicago, on the first and third Fridays of each month at 8 p. m. J. R. Cravath, Secretary.

Civil Engineers' Club of Cleveland.—Meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

Civil Engineers' Society of St. Paul.—Meets on the first Monday of each month except June, July, August and September.

Denver Society of Civil Engineers.—Meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month, except during July and August.

Eastern Maintenance of Way Association.—The annual convention will be held Sept. 26 to 29 at Portland, Me. F. C. Stowell, Ware, Mass., Secretary.

Engineers' Club of Cincinnati.—Meets at the rooms of the Literary Club, 25 East Eighth street, on the third Tuesday of each month, excepting July and August, at 6.30 p. m.

Engineers' Club of Columbus, (O.).—Meets at 12½ North High street on the first and third Saturdays from September to June.

Engineers' Club of Minneapolis.—Meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

Engineers' Club of St. Louis.—Meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

Engineers' Society of Western New York.—Holds regular meetings on the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

Engineers' Society of Western Pennsylvania.—Meets at 410 Penn avenue, Pittsburgh, Pa., on the third Tuesday in each month, at 7.30 p. m.

Locomotive Foremen's Club.—Meets every second Tuesday in the club room of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.

Master Car & Locomotive Painters' Association.—The annual convention will be held Sept. 12 at Philadelphia, Pa. Robert McKeon, Secretary, Kent, O.

Montana Society of Civil Engineers.—Meets at Helena, Mont., on the third Saturday in each month at 7.30 p. m.

New England Railroad Club.—Meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.

New York Railroad Club.—Meets at 12 West Thirty-first street, New York City, on the third Thursday in each month at 8 p. m., excepting June, July and August.

Northwest Railway Club.—Meets on the first Tuesday after the second Monday in each month at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

Northwestern Track and Bridge Association.—Meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

Roadmasters' Association of America.—The annual convention will be held in Detroit, Mich., Sept. 12. J. B. Dickson, Secretary, Sterling Ill.

St. Louis Railway Club.—Holds its regular meeting on the second Friday of each month at 3 p. m.

Southern and Southwestern Railway Club.—Meets at the Kimball House, Atlanta, Ga., on the second Thursday in January, April, August and November.

Technical Society of the Pacific Coast.—Meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

Traveling Engineers' Association.—The annual convention will be held in Cincinnati, O., Sept. 12. W. O. Thompson, Secretary, Elkhart, Ind.

Western Foundrymen's Association.—Meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is Secretary.

**Eastern Maintenance of Way Association.**  
 The seventeenth annual convention of the Eastern Maintenance of Way Association, formerly the New England Roadmasters' Association, will be held at Portland, Me., Sept. 26 to 29. The Secretary is Mr. F. C. Stowell, Ware, Mass.

#### Institute of Mining Engineers.

The seventy-seventh meeting of the American Institute of Mining Engineers will be held in San Francisco, Cal., beginning about Sept. 25. A special train of sleeping cars will leave Chicago Sept. 16 by the way of St. Paul, Butte, Anaconda and Portland. The same special train will carry the party on an excursion through California and eastward through Arizona. A side excursion will be made to the copper mines of Bisbee, Ariz. There will be an opportunity for a trip to the Yosemite Valley. Throughout the trip, except while at San Francisco, these sleeping cars will be available as hotels for lodging and meals. It is estimated that the complete round of meetings and excursions will occupy 34 days from Chicago to San Francisco and back and that the actual cost will be \$225 for each person. This does not include expenses at San Francisco. The office of the Secretary of the Institute, Dr. R. W. Raymond, is now at 99 John St., New York City.

#### PERSONAL

(For other personal mention see Elections and Appointments.)

—Mr. A. E. Chamberlain, for several years Cashier of the Lehigh Valley RR., at Towanda, Pa., died June 29 of Bright's disease, aged 55 years.

—Mr. James H. Barr, of Chattanooga, Tenn., General Counsel of the Rome & Southern Ry., died at Cumberland Island July 4.

—Mr. Hugh D. Scott, who was Superintendent of the Baltimore & Harrisburg Division of the Western Maryland RR., died at Gettysburg, Pa., June 29, aged 54. Mr. Scott was born in Gettysburg in 1845 and entered the railroad service in 1862. In 1887 he became General Superintendent of the Hanover Junction, Hanover & Gettysburg RR., and later, when the road was leased to the Western Maryland, he was made Superintendent of the B. & H. Division of the Western Maryland.

—President Arthur T. Hadley, of Yale University, is now a Doctor of Laws, that degree having been conferred upon him by Harvard University at the commencement last week. The title of LL. D. was at the same time conferred on Admiral Sampson and General Leonard Wood.

—Mr. David N. Pasho died at Dunkirk last Thursday, aged 70 years. Mr. Pasho was formerly connected with the Erie as Master Mechanic and in 1870 became Traveling Engineer. Mr. Pasho was a personal friend of Horatio G. Brooks, founder of the Brooks Locomotive Works.

—Mr. F. F. Whittekin, C. E., of Tionesta, Pa., at present Chief Engineer and General Manager of the Antioquia Government Railroad, Colombia, South America, has under consideration an offer made by M. Ghooley Hassan Kahn, former Minister from Persia at Washington, to enter the service of the Persian Government as General Director of the railroad now under consideration by the Imperial Government, to be built from some point on the Persian Gulf to Teheran, the Capital of the Empire. No surveys have been made, and it is the design of the Government to make exhaustive examinations before beginning any real construction, and during his residence in Washington the Kahn became somewhat acquainted with Mr. Whittekin's work on the Denver & Rio Grande, the Mexican and the South American Government roads. Six months' time is given to consider the proposition, and accept or refuse it.

—The Board of Directors of the Pennsylvania Railroad Company, at their meeting on June 28, appointed Mr. Henry P. Conner Acting Assistant Treasurer of the Company, on account of the illness of Mr. P. Frank Hunter, Assistant Treasurer, with all the powers, duties and responsibilities assigned by the organization to the Assistant Treasurer.

Mr. Conner was born in Radnor Township, Delaware County, Pa., March 11, 1866, on the farm of his parents, where he has always lived. His early education was obtained at the public schools of the township, after which he attended for two years Prof. Geo. Eastburn's Academy in Philadelphia, from which he graduated in 1883. He entered the employ of the Pennsylvania Railroad Company as a clerk in the Accounting Department, and, after a service of twelve years, the duties of Special Agent of the Accounting Department were assigned to him.

—General Horatio Gouverneur Wright, United States Army, died in Washington July 2. He was born in Clinton, Conn., March 6, 1820, and after graduating second in his class at West Point in 1841, entered the Engineers. At the outbreak of the Civil War he was made a Brigadier-General of Volunteers, and served with distinction until the close. He took command of the Sixth Corps, May 9, 1864, on the fall of Sedgwick. His subsequent war record is that of the Sixth Corps. With the Army of the Potomac he was present at every engagement up to July, 1864, when he was summoned from the front of Petersburg with his corps to the defense of Washington, then threatened by the Confederates under General Early. The Sixth Corps arrived in Washington in time to meet Early, who had just defeated the Union forces at Monocacy, and drove him back into the Shenandoah Valley. It was General Wright who did so much to retrieve the losses at Cedar Creek, Oct. 19, 1864, where also he was severely wounded, and it was his corps that first broke through at Petersburg on Sunday, April 2, 1865. He was the author jointly with General J. G. Barnard and Colonel P. S. Michie of a report on the "Fabrication of Iron for Defences." He became Chief of Engineers in 1879 and was retired in 1884. He was made an Honorary Member of the American Society of Civil Engineers in 1890, and was a Brigadier-General and Brevet Major-General in the regular army.

#### ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—J. M. Barr, heretofore Vice-President and General Manager of the Norfolk & Western, has been elected to succeed C. M. Higginson, deceased, on the A., T. & S. F., his title being Third Vice-President.

Baltimore & Ohio.—Harvey Middleton, heretofore General Superintendent of Motive Power, has been appointed Mechanical Superintendent. David Lee, heretofore Engineer Maintenance of Way, lines

West of the Ohio River, has been appointed Superintendent Maintenance of Way of the Trans-Ohio Division. D. A. Williams has been appointed Superintendent of Stores. At a meeting of the stockholders the following Directors were elected: William Salomon, Chairman, New York; Jacob H. Schiff, New York; James J. Hill, St. Paul; Norman B. Ream, Chicago; James Stillman, New York; Edward H. Harriman, New York; J. Kennedy Tod, New York; Charles Steele, New York; Alexander Brown, Baltimore; H. Clay Pierce, St. Louis.

Isaac N. Kalbaugh, heretofore Superintendent Motive Power, has been appointed Assistant Mechanical Superintendent of the Trans-Ohio Division, with headquarters at Newark, O. Ebenezer T. White, heretofore Superintendent Motive Power, has been appointed Assistant Mechanical Superintendent of the lines east of the Ohio River, with headquarters at Mt. Clare, Baltimore. The offices of Superintendents of Motive Power have been abolished. Effective July 1.

Birmingham Southern.—The officers of this company, whose property was recently sold to the Louisville & Nashville and the Southern (see R.R. news column, June 30, p. 484), are as follows: President, Jones G. Moore of Blocton, and Vice-President, Addison G. Smith. The Directors are as follows: J. G. Moore, N. P. Smith, J. M. Falkner, H. Smith and W. W. Findley. President J. G. Moore will for the present assume the duties of General Manager.

Chicago & Northwestern.—C. A. Lichty has been appointed Superintendent of Bridges and Buildings, with headquarters at Lake City, Ia. Mr. Lichty will also have charge of the Engineering on the Western Iowa Division.

E. G. Schevenell has been appointed Assistant Superintendent of the Iowa Division, with headquarters at Belle Plaine, Ia., succeeding S. M. Braden.

Chicago, Lake Shore & Eastern.—F. W. Sutton has been appointed Auditor, with headquarters at 1051 The Rookery, succeeding H. H. Kendrick, resigned. Effective June 22.

Chicago Terminal Transfer.—John N. Faithorn, President of the St. Louis, Peoria & Northern, has been elected Vice-President of the C. T. T., succeeding S. R. Ainslie, resigned. Effective Aug. 1.

Copper Range.—A. A. McFall, heretofore Auditor of the Wisconsin & Michigan at Peshtigo, Wis., has been appointed Superintendent, with headquarters at Marquette, Mich., of the C. R., which is now building. (See R.R. construction column, Apr. 28, p. 305.)

Delaware & Hudson.—J. R. Slack has been appointed Assistant Superintendent of Motive Power, with headquarters at Albany, N. Y. Effective July 1.

Denver & Rio Grande.—C. H. Quereau, heretofore Master Mechanic, has been appointed Assistant Superintendent of Machinery and Acting Master Mechanic, with headquarters at Denver, Col.

Great Northern.—G. T. Sanderson has been appointed Master Mechanic, with headquarters at Havre, Mont., succeeding J. McGie, resigned.

Kansas City & Omaha.—J. F. Elder has been appointed Auditor and Assistant Treasurer, succeeding J. G. Drew, resigned.

Kansas City, Pittsburgh & Gulf.—J. J. Merrill has been appointed Superintendent of Transportation, with headquarters at Texarkana, Tex. C. A. DeHaven has been appointed Master Mechanic, succeeding W. J. Miller, resigned.

Keokuk & Western.—A. McCrae has been appointed General Freight and Passenger Agent. W. G. Goodrich has been appointed Assistant General Freight and Passenger Agent. Effective July 1.

Missouri Pacific.—J. T. Stafford has been appointed Acting Division Master Mechanic of the St. Louis, Iron Mountain & Southern, a subordinate line of the M. P., with headquarters at Baring Cross, Ark., succeeding Mord Roberts, resigned. Effective July 1.

New York Central & Hudson River.—E. E. Davis has been appointed Assistant Superintendent of Motive Power.

New York, Ontario & Western.—At a meeting of the stockholders, held June 28, Grant B. Schley was elected a Director, succeeding John G. Moore.

Omaha, Kansas City & Eastern.—Charles E. Gibbs has been appointed General Freight and Passenger Agent, succeeding Mr. J. H. Best, resigned.

Oregon City & Southern.—The officers of this company, referred to in the Construction column, are: President, W. H. Burghardt; Vice-President, Elmer Dixon; Secretary, Nathan M. Moody. Other Directors are W. A. Huntley, Charles Holman and Wm. Vaughan. The main office is Oregon City, Ore.

Panama.—A. Hendee has been appointed Master Mechanic, with headquarters at Colon, Colombia, succeeding Percy Webb, resigned.

Pennsylvania.—Henry P. Conner has been appointed Acting Assistant Treasurer, owing to the illness of P. Frank Hunter, Assistant Treasurer.

Philadelphia & Baltimore Central.—H. F. Kenney, on June 28, was elected President.

Philadelphia & Reading.—L. B. Paxon, heretofore Superintendent Motive Power and Rolling Equipment, has been appointed Consulting Mechanical Engineer, a position recently created. Effective Aug. 1. S. F. Prince, Jr., heretofore Superintendent Motive Power and Equipment of the Long Island, has been appointed Superintendent Motive Power and Rolling Equipment of the P. & R., succeeding L. B. Paxon, transferred.

Pittsburg, Bessemer & Lake Erie.—E. C. Brown has been appointed Principal Assistant Engineer, with headquarters at Greenville, Pa. Effective July 1.

Plant System.—It is announced in several of the newspapers that Vice-President R. G. Erwin has been elected President of the P. S., succeeding H. B. Plant, deceased.

Velasco Suburban & Belt Line.—The officers of this company referred to in the Construction column are: President and General Manager, E. D. Dorchester; Vice-President, F. Caldwell; Secretary, W.



W. Anderson; Treasurer, B. Lindemuth. The company's headquarters are Velasco, Tex.

West Jersey & Seashore.—At a meeting of the stockholders William J. Sewell, heretofore First Vice-President, was elected President, succeeding Frank Thomson, and A. J. Cassatt was elected a Director.

West Virginia & Pittsburgh.—M. F. Cahill has been appointed Supervisor of Bridges and Buildings, succeeding E. R. Curtis, transferred.

#### RAILROAD CONSTRUCTION, New Incorporations, Surveys, Etc.

ABERDEEN & ROCK FISH.—This line, according to report, is being extended from Raeford, N. C., southeast about 15 miles to the Atlantic & Yadkin branch of the Atlantic Coast line at Hope Mills.

ABINGDON & DAMASCUS.—Surveys were reported begun under Robert Gray, of Bristol, Tenn., June 27, for this line from Damascus, Va., south to Shady Valley in Johnson County, Tenn. (June 30, p. 482.)

ALABAMA ROADS.—T. S. Bowling is building a logging road from the Tombigbee River, near St. Stephens, west through Washington County to its center.

R. E. Spraggins, of the Huntsville, Ala., Chamber of Commerce, and J. B. Gibson, Secretary of the Birmingham Commercial Club, are at work on a proposition to build a railroad from Hobb's Island, on the end of a branch of the Nashville, Chattanooga & St. Louis, to run south about 40 miles to Oneonta on the Louisville & Nashville. This will give a direct connection to Huntsville, and furnish a coal outlet to Birmingham in northern Alabama territory.

The proposed line from Montgomery, Ala., north through Mixburg, Kellyton and Fort Wayne to Chattanooga or Nashville, recently referred to in this column, is being carried forward under W. H. Hoskin, of Chattanooga, General Manager. (June 23, p. 460.)

ATCHISON, TOPEKA & SANTA FE.—The improvements in progress on the El Dorado branch in Kansas consist of replacing the old 56-lb. with new 61-lb. steel and ballasting the line. (Official.)

ATLANTIC COAST LINE.—The authorities at the penitentiary at Raleigh, N. C., have signed a contract to furnish 100 convicts July 10, and 100 more Aug. 1 to grade the Southeastern extension from Elrod, N. C., southeast through Ashpole (now Union City) to Hub, on another line of the A. C. L. (Southeastern, March 24, p. 217.)

ATLANTIC, VALDOSTA & WESTERN.—The first through train from Jacksonville, Fla., northeast to Valdosta, Ga., was run June 27. The line as completed extends between these two points, 107 miles. (May 26, p. 379.)

BAY & COAST.—This company has been incorporated in California, with a capital stock of \$3,000,000, to build a railroad from San Francisco south about 100 miles to Santa Cruz, with power also to operate ferry boats in connection with the road. L. H. Barnard, H. Lacey, and J. G. Hughes are among the incorporators.

BISMARCK, WASHBURN & FORT BUFORD.—E. S. Page & Co., of Anoka, Minn., have the contract for grading the first 12 miles of this line, from Bismarck, N. D., northwest through Washburn to Fort Buford, on the western boundary line. Contracts are to be let for the additional 12 miles. Grading is to be begun immediately. W. D. Washburn, of Minneapolis, Minn., is an incorporator. (May 26, p. 379.)

BOSTON & ALBANY.—A spur of about 1½ miles is being built at Pittsburgh, Mass., to accommodate the Bowe Granite Co.

BURLINGTON, CEDAR RAPIDS & NORTHERN.—Surveys are in progress for the extension from Greene, Butler County, Ia., on the main line, to run northwest via Mason City, about 50 miles through Floyd, Gordo and Winnebago counties to Forest City, to connect with the branch of the Iowa Falls & Northwestern line of the company.

CAIRO & KANAWHA VALLEY.—This line, which now runs from McFarlan, W. Va., through Ritchie County, north 17 miles to Cairo, on the Baltimore & Ohio, is to be extended, according to report, north about 15 miles to the Ohio River RR., either at St. Marys or Waverly.

CALIFORNIA ROADS.—The Brooking Lumber & Box Co., of San Bernardino, has advertised for contracts for the rails and rolling stock on its proposed narrow-gauge line in San Bernardino Mountain. There are about 40 men at work on the grade. (June 23, p. 460.)

The West Side Flume & Lumber Co., with headquarters at 229 Crocker Bldg., San Francisco, is building its logging road, already noted (March 24, p. 217), from Carters to timber land, 12 miles. (Official.)

CANADIAN PACIFIC.—T. G. Shaughnessy, President, has given an emphatic denial of the report that this company has made an agreement with the Great Northern to build a short line from Midway, B. C., to Republic, Wash. (June 30, p. 482.)

Messrs. Pouppe & McVeigh, who have the contract for the Lardeau Duncan branch in British Columbia, are rushing men into the Kaslo District as rapidly as possible, and grading is being rushed from the head of Kootenay Lake to Trout Lake, 35 miles. (May 19, p. 359.)

Grading on the North Star branch, according to report, is to be begun this month from Cranbrook, B. C., north 22 miles to Kimberley. This is practically the proposed extension north up the east side of the Kootenay River to Windamere, and thence to the Revelstoke branch. (Dec. 16, 1898, p. 903.)

CEDAR RAPIDS, GARNER & NORTHWESTERN.—The increase of \$100,000 in the capital stock, to which reference was made in the News column last week (p. 484), is reported to be for an extension westward from Titonka, Ia., through the center of Kossuth County, presumably to Bancroft.

CHICAGO & NORTHWESTERN.—Rapid progress is being made on the second track work in Iowa from Tama City to Marshalltown, 22 miles. The grading is nearly completed, the ties laid and many of the culverts built. West of Marshalltown hun-

dreds of men and teams are grading and getting the roadbed ready. Other equally large forces of men and teams are at work between Ames and Boone, and also on the large steel bridge over the Des Moines River north of Moingona. This second track is being built with 90-lb. rails. (March 17, p. 197.)

Additional side tracks with other improvements, according to report, will be made at Fond du Lac, Wis.

CHIHUAHUA & PACIFIC.—Track is laid for 45 miles from Chihuahua, Mex., to a point 30 miles beyond Santa Isabel. The section under contract is from Chihuahua west 125 miles to Guerrero, and the line is to be extended to the Pacific Coast, 450 miles from Chihuahua. (May 12, p. 343.) C. Sheldon of Chihuahua, Mex., is General Manager, and A. Page of 80 Broadway, New York, President. (Official.)

CHIHUAHUA MINERAL.—Four miles of track is laid on this line from Chihuahua, Mexico, southeast 15 miles to Santa Eulalia. The Chihuahua Universal Ry. Co. has the contract. The company proposes also to extend its line from Santa Eulalia six miles to mines, and from Tabalopa to Descubridora, five miles. (Feb. 24, p. 146.) Fred. Duclos, of Chihuahua, Mexico, is Vice-President and General Manager. (Official.)

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—Indiana press reports state that bids are being received for improvements at Anderson, Ind., including new yards south of the city.

COLORADO & SOUTHERN.—The Belt Line at Leadville, Col., which is being built by this company, is under the incorporation of the Leadville Mineral Belt (Nov. 11, 1898, p. 820), entered in Colorado, Oct. 29, 1898, with a capital stock of \$100,000. It is simply a spur two miles long, intended to reach some few mines at Leadville, and will be operated as such by the C. & S. (June 23, p. 461.) Building is being done by the company with no increase of forces, and is nearly completed. (Official.)

CONWAY SEASHORE.—Track is reported laid for six miles on this line, from Conway, S. C., southeast 14 miles, to the Atlantic Coast. Grading is being done by the company. F. A. Burroughs, of Conway, is President, and D. T. McNeill General Manager.

COVINGTON & SOUTHERN.—This company was incorporated in Indiana, June 28, with a capital stock of \$50,000, to build a railroad from Covington, Ind., on the Wabash, south into the adjoining county of Parke. The Directors are: George E. Johnson, Bayard Taylor, Guy Miltimore, F. P. Dobson and Elsha Whittlesey, Jr., all of Chicago, Ill.

DELAWARE & HUDSON.—An agreement has been made between this company and the Erie to build a connecting line from Waymart, Pa., east over the mountains to Carbondale to connect with the Erie.

DULUTH & NEW ORLEANS.—Representatives of this company are reported trying to buy right of way into the city of Des Moines, Ia., from the east, and as soon as these arrangements are completed grading is to be begun early in July. The line as projected is from Duluth, Minn., south through Des Moines to New Orleans, La. S. V. Wardall, of Ames, Ia., is Vice-President. (May 19, p. 359.)

DENVER & RIO GRANDE.—Surveys are reported in progress for the Rio Grande, Pagosa & Northern line from a point on the D. & R. G., near the New Mexico boundary, to run northeast about 30 miles to Pagosa Springs. The line is backed by the D. & R. G.

EASTMAN & OCMULGEE RIVER.—Grading is to be begun soon on this line from Eastman, Ga., south 13 miles to a connection with the Georgia & Alabama on the Ocmulgee River. Walter W. Clements, of Eastman, Ga., is interested. (Oct. 28, 1898, p. 786.)

EDMONTON & SASKATCHEWAN.—After amending the bill so that the railroad is to pass into the town of Fort Saskatchewan instead of "in or near," the bill has passed the Railroad Committee, and was given a third reading. The line is to run from South Edmonton, B. C., to Victoria, and thence back to Edmonton via Beaver Hills Hat. Among the incorporators are John E. O'Meara, of Ottawa; Wm. MacLaren, of Edmonton, and R. B. Bennett, of Calgary.

FORT WORTH & RIO GRANDE.—A proposition is before the Texas Railroad Commission to extend this line from Brownwood, Tex., south about 175 miles to San Antonio. (Jan. 13, p. 23.)

GAINESVILLE & GULF.—Ten miles of track is reported laid on the proposed extension from Gainesville, Fla., north 20 miles to Sampson City on the Southern. (May 5, p. 323.)

GREAT NORTHERN.—The cut-off from Coon Creek, Minn., north about 56 miles to Brook Park, was to be completed on July 1. (May 26, p. 379.)

GREAT NORTHERN (CANADA).—Grading is making rapid progress between Joliette and St. Canut. There are some 500 men and 200 teams at work on the several subsections. The line is projected from Hawkesbury, Ont., northeast to Quebec. Among the bridges will be one over L'Assomption River, with a clear span of 170 ft. (May 19, p. 359.)

GULF, BEAUMONT & KANSAS CITY.—The extension of this line is from Newtonville, Tex., north 140 miles to Waskom, on the Missouri, Kansas & Texas. Surveys are completed, permanent locations made and detail of work will be ready for inspection by July 15. It is expected that contracts for grading, track-laying, etc., will be let early in August. The earthwork will be about 20,000 yds. per mile, but will not be difficult, as there is but little rock, shale or hardpan. The maximum grade is 1 per cent., and the maximum curves 3 deg. There will be about three miles of wooden trestling and the other bridging will be of the same character, to be substituted later by steel structures. New securities are to be issued for this extension, and these will probably be handled through Messrs. Lee, Higginson & Co., of Boston. (June 23, p. 461.)

There is nothing in the report of a proposed extension from Jasper to Lufkin to connect with the St. Louis Southwestern. (Official.)

HARRIMAN & NORTHEASTERN.—The General Manager confirms the statement made two weeks ago (p. 461) that surveys are directed for an extension from Stevens, Tenn., west about six miles to Wertburg. It has not yet been determined whether the road will be built.

ILLINOIS & MISSISSIPPI VALLEY TERMINAL.—This line, when completed, is to run from Alton, Ill., south 16 miles to Edwardsville. It is completed from Alton to Edwardsville Crossing, 4.3 miles, and grading is in progress from that point. The Wrought Iron Bridge Co., of Canton, O., has the contract for the bridges, and Charles Melville, the contract for the grading. The company was incorporated in Illinois June 23. Wm. E. Smith, of Alton, Ill., is President, and H. E. Swift Chief Engineer. (June 30, p. 483.)

ILLINOIS CENTRAL.—An official writes that there is nothing yet decided as to the proposed extension from Parsons, La., east about 15 miles to Grenada. (June 23, p. 461.) Illinois press reports state that this company is considering an extension from Rockford, Ill., southwest about 40 miles along the Rock River Valley to Dixon.

INVERNESS & RICHMOND.—The contractors for this line are Ryan & McDonell, and their contract embraces the entire 60 miles from Point Tupper, N. S., on the Strait of Canso northward. Some 30 miles is to be built this year. There are about 200 men at work under the company, and these are to be increased to 1,000 at once. Hugh Doheny has charge of the contract. (June 2, p. 393.)

IOWA & MISSISSIPPI VALLEY.—The Common Council of Burlington, Ia., has granted right of way through the city for this proposed line from Elrick, Ia., the terminus of the Muscatine North & South, to run south about 23 miles to Burlington. W. R. Stewart, of Elrick, President of M. N. & S., is interested.

KANAWHA & MICHIGAN.—Improvements in the roadbed are being made between Charleston, W. Va., and Gauley Bridge, including much gravel ballasting.

KELLYTON & ROCKFORD.—J. L. Cowan, of Opelika, Ala., has just completed a survey of this line from Kellyton, Ala., on the Central of Georgia, to run west 17 miles to Rockford. The estimates and maps are completed. F. M. Darsey, of Hissop, Ala., is interested. (Nov. 4, 1898, p. 804.)

KENTUCKY ROADS.—The Southern Construction Co., of St. Louis, Mo., according to report, has taken the contract to build a railroad from Dixon through Webster County to a point on the Illinois Central between Sturgis and Blackford.

KOKOMO, WABASH & NORTHERN.—This company was incorporated in Indiana June 29, with a capital stock of \$300,000, to build a railroad from Kokomo northeast 36 miles to Wabash. The Directors are: Warren Bigler, J. R. Bruner, James Lynn, R. F. Lutz, Wabash; John M. Leach, J. D. Johnson, W. E. Blackledge and G. W. Landon, Kokomo; D. C. Jenkins, Greentown; W. S. Davis, Somerset, and Roscoe Kimple, Converse, Ind.

LINDSAY, BOBEAYGEON & PONTYPOOL.—A new company is being formed, according to report, to build this line in Ontario, connecting the three cities named in the title. It is to be 40 miles long, and has a subsidy from the Dominion Government. W. C. T. Boyd, of Bobeaygeon; H. J. Weekham, of Ontario, and Senator Dobson, of Lindsay, are interested.

LOUISVILLE & NASHVILLE.—Surveys are reported in progress for a branch from East Begstadt, Ky., east about 20 miles to Manchester.

Press reports state that preparations are completed for a line connecting this company's road with the Nashville, Chattanooga & St. Louis, near Memphis, Tenn.

MANITOBA & GULF.—This company, according to report, will soon file incorporation articles in Minnesota to build an extension of the Kansas City, Pittsburgh & Gulf north to Duluth, Minn. Surveyors are to begin work at once locating the line from the Iowa border north to Sauk Center.

MEXICO, CUERNAVACA & PACIFIC.—Track is laid to the Balsas River, 35 miles beyond Iguala. This completes about 182 miles from the City of Mexico. The line is to be extended still further west 133 miles to Acapulco. The Mexico & Acapulco Construction Co., of Mexico City, has the general contract. (Nov. 4, 1898, p. 804.) J. H. Hampson, of the City of Mexico, is President. (Official.)

MISCELLANEOUS COMPANIES.—South Atlantic Construction Co. has been incorporated in South Carolina, with a capital stock of \$100,000, to build and operate railroads. The incorporators are: Wm. A. Barber, J. H. Marion and Paul Hardin.

MISSOURI PACIFIC.—Improvements are now in progress on the line from Osawatimie, Kan., south to Van Buren, Ark., including the relaying of track and the straightening of curves.

MISSOURI ROADS.—Articles of incorporation are to be filed soon in Missouri for a railroad from Springfield northeast about 80 miles to connect with the Bagnell branch of the Missouri Pacific south of Jefferson City. Chas. A. McCann, President of the Springfield Wagon Co., of Springfield, is interested.

NEW JERSEY ROADS.—A Committee of Newton people, headed by W. D. Ackerson, is seeking to build a railroad from that city northwest about three miles, to connect with the New York, Susquehanna & Western line of the Erie.

NORTHERN PACIFIC.—Grading is completed as far as Kamiah, Id., 70 miles from Lewiston, on the Clearwater Short Line, and only six miles will carry the grading into Stuart, the objective point for this season. (June 30, p. 483.)

OFFERMAN & WESTERN.—Work is to begin at once on this recently incorporated line from Offerman, Pierce County, Ga., on the Plant system, to run northwest through Appling and into Coffee County. Henry P. Talmadge, of New Jersey, and Frank B. Haviland, of New York, are incorporators.

OREGON CITY & SOUTHERN.—This company has been organized to build a railroad from Oregon City, Ore., on the Southern Pacific, south about 30 miles through Molalla and Wilhoit to Silverton. The officers are given under Elections and Appointments.

PENNSYLVANIA.—This company is reported



making surveys for a line from South Fork, Pa., southeast about 25 miles to Cessna.

**PENNSYLVANIA ROADS.**—The Vinton Lumber Co. is reported building a lumber road from Vintondale, on a branch of the Pennsylvania, to run north about 14 miles to Nicktown.

**PORTAGE DU FORT & BRISTOL BRANCH.**—The Dominion Railroad Committee has rejected the bill for this company for a line from Pembroke, Ont., east about 100 miles along the Ottawa River to Hull, Que., on the ground that it would parallel the proposed Pontiac Pacific Junction line. (June 16, p. 439.)

**PORTO RICO ROADS.**—The War Department has decided not to grant any permanent franchises without the authority of Congress. This decision is based on the opinion of the Attorney-General.

**RED DEER VALLEY.**—Negotiations are under way, according to report, for the immediate building of 55 miles of this line from Calgary, N. W. T., to Kneehill.

**RIO GRANDE & PAGOSA SPRINGS.**—Surveys are reported completed for the extension of this line from Edith, Col., north 30 miles to Pagosa Springs. It runs from Lumberton, N. M., north to Edith. E. M. Biggs, of Edith, Col., is President. (June 3, 1898, p. 399.)

**RIO GRANDE WESTERN.**—According to report, a branch will be built from a point on the Schofield branch in Utah, near the Old Winter Quarters coal mines, to run southwest about 10 miles to undeveloped coal fields.

**RUMFORD FALLS & RANGELEY LAKES.**—Application has been made to the Maine State Railroad Commissioners for permission to extend this line northward from its terminus at Bemis.

**SANTA FE, PRESCOTT & PHOENIX.**—Preliminary surveys have been made between Phoenix, Ariz., and Ingleside, but the company is still undecided as to whether a line will be built. (Official.)

**SEABOARD AIR LINE.**—A letter from E. St. John, Vice-President and General Manager, confirms the statement made last week (p. 483) that M. J. Condon of Knoxville, Tenn., has taken the contract for building the line from Cheraw southeast to Camden, S. C., and thence to a connection with the Florida Central & Peninsular. Work is to be begun on the line south of Cheraw this week.

**SOUTHERN.**—It has been determined to extend the newly acquired Santa Ana & Newport line west to a connection with the Los Alamitos branch, at Benedict, Cal. It will probably include the line already proposed through Westminster. (May 12, p. 343.)

It is proposed to build a cross-country branch from a point 1½ miles west of Morristown, Tenn., to run east to Roe, a station two miles south of Morristown on the Asheville Division. Surveys are completed.

**SOUTHERN PACIFIC.**—The General Manager writes with reference to improvements in progress on the line between Gonzales, Cal., and Surf, that the company now has under way various line changes aggregating 35 miles in length and reducing the maximum curvature to six deg. Thirty miles of these changes are already made, the new track being of 75-lb., continuously tie-plated steel, laid on redwood ties. This line is now being rebalasted. About five miles more remain to be changed. Altogether, including the changes made and to be made, in addition to the above there will be 75-lb. rails laid on 48 miles of track. (June 9, p. 418.)

Grading is completed as far as Springfield on the extension from Oxnard, Cal., to Simi, and it is expected that trains will be running to Somis by Aug. 1. (June 23, p. 462.)

**TACOMA & COLUMBIA RIVER.**—Arrangements are completed, according to report, for the extension southward of this line. Mills & Tweeden, who received the contract last year and were compelled to suspend work on account of the appointment of a receiver, have moved their pile driver back to the grade. (Feb. 17, p. 132.)

**TENNESSEE ROADS.**—Grading is in progress on the line of the Elk Valley Coal & Iron Co., from Elk Valley Station on the Southern, into its mineral and timber lands, about 1¼ miles. This section is to be completed by Aug. 1. The company proposes also to extend the line an additional four miles, but this work may not be undertaken this season. (May 5, p. 324.)

**TRANSYLVANIA.**—This company, successor to the Hendersonville & Brevard, is making many improvements on its line, and is getting ready for the proposed extension southwest about 12 miles to Easteloe. J. F. Hays, of Hendersonville, N. C., is General Manager. (Railroad News column, May 5, p. 324.)

**UTAH & PACIFIC.**—Orders have been received to complete the last five miles at once to McCune, on the Utah State line, which will complete 75.5 miles southwest from Milford, Utah. (June 30, p. 484.) A. W. McCune, of Salt Lake City, Utah, is President.

**VELASCO SUBURBAN & BELT LINE.**—This company, whose incorporation in Texas has been noted (June 23, p. 462), is building seven miles of line from Velasco, Tex., south to Surfside, of which four is completed. It is being done by the company. There are 50 men at work. The track is being laid with 56 and 60-lb. rails. The officers are given under Elections and Appointments. (Official.)

**WABASH.**—This company is rebuilding its bridges, ballasting its roadbed and relaying the track between Hardy, Ia., and Albia. This section has not been in use for several years and is being prepared preparatory to its use in connection with the Moulton Albia line now building.

**WAYNESBORO & MOSS POINT.**—This company is being organized to build a railroad from Waynesboro, Miss., on the Mobile & Ohio, to run south about 100 miles to the Gulf of Mexico, connecting with the Moss & Pascagoula at Moss Point. D. M. Taylor represents the citizens of Waynesboro, Miss.

**WISCONSIN ROADS.**—L. W. Gates, of Milwaukee, Wis., is head of a syndicate which proposes to build a railroad from Stanley, Wis., on the Wisconsin Central, to run northwest about 150 miles to Superior. It is stated that funds are already raised for the road.

## GENERAL RAILROAD NEWS.

**BALTIMORE & OHIO.**—By order of Judge Morris of the United States Circuit Court at Baltimore, June 29, the property of this company was turned over to the stockholders at midnight, June 30. The property went into the hands of receivers March 1, 1896.

The stockholders on June 28, at Baltimore, authorized the issue of \$20,000,000 additional preferred stock and \$10,000,000 additional common stock, to carry out the reorganization plan of absorbing the Baltimore & Ohio Southwestern. (June 2, p. 394.)

Brown, Shipley & Co., of London, give notice to holders of certificates of deposit for 5 per cent. first mortgage gold bonds of the Baltimore Belt, issued under the bondholders' agreement of Nov. 1, 1897, that the B. & O. Co. has elected to exercise its option to buy the deposited bonds at par and accrued interest, on Sept. 1, 1899, and to offer in exchange new first mortgage 4 per cent. 50-year gold bonds of the B. & O., including the coupons maturing on and after Oct. 1, with overdue interest on the old coupons paid in cash. Holders of certificates who desire to accept the offer must do so prior to July 20.

Holders of certificates of deposit for Staten Island Rapid Transit second mortgage 5 per cent. gold bonds, issued under the bondholders' agreement of July 5, 1898, are notified that Hallgarten & Co., New York, will pay \$76.87 on each bond, being the interest due July 1, 1898; Jan. 1, 1899, and July 1, 1899, with interest to July 1. (Oct. 7, 1898, p. 733.)

**BIRMINGHAM & ATLANTIC.**—A syndicate headed by Eugene Zimmerman, Vice-President of the Cincinnati, Hamilton & Dayton, is said to have bought this road, which runs from Talladega, Ala., to Pell City, 21.5 miles, with a branch from Ragons to Log Pits, 9.5 miles. The capital stock is \$1,000,000, and the funded debt \$337,000.

**BOSTON & ALBANY.**—Following a meeting of the Directors of the New York Central & Hudson River at New York City, June 30, President S. R. Callaway issued the following bulletin:

At a meeting of the Board of Directors of the New York Central & Hudson River Railroad Company, held to-day, the lease of the Boston & Albany Railroad to the New York Central & Hudson River Railroad Company, for the period of 99 years, was unanimously passed, and President Callaway has been notified that similar action has been taken by the Directors of the Boston & Albany Railroad Company. (June 30, p. 484.)

**CENTRAL PACIFIC.**—D. O. Mills and Ogden Mills, as mortgage trustees at Sacramento, Cal., on June 30 brought suit to foreclose the first mortgage A bonds of this company, aggregating \$6,638,000. The bonds matured on July 1, 1895, and have been renewed from time to time until Dec. 1, 1898. On June 21, 1899, the holders of more than 50 bonds requested that the trustees begin foreclosure proceedings. (April 21, p. 291.)

**COLUMBUS, SANDUSKY & HOCKING.**—The Reorganization Committee, of which Louis Fitzgerald is Chairman, under date of June 29 announces that it has become inexpedient to carry out the plan of reorganization of May 12, 1898, and in view of pending litigation, a new plan is at present impracticable. The Committee therefore will no longer act in behalf of the bondholders. (June 9, p. 418.)

**DELAWARE & HUDSON.**—Cherry Valley, Sharon & Albany bonds, with a face value of \$300,000, due June 15, are being paid and redeemed by the D. & H.

**DELAWARE VALLEY, HUDSON & LEHIGH.**—Press reports state that Sheriff Fisher of Monroe County, Pa., sold the property, right of way, etc., of this company on July 2 for \$100. The line as projected is from Saylorsburg, Pa., through Monroe County via Stroudsburg to Matamoras in Pike County. (Railroad Construction column, Sept. 15, 1898, p. 532.)

**LOUISVILLE, EVANSVILLE & ST. LOUIS.**—Judge Wood, at Indianapolis, Ind., on June 24, authorized the receiver to issue \$350,000 4 per cent. receiver's certificates to buy 500 coal cars. (May 26, p. 380.)

**MEXICAN NATIONAL.**—Matheson & Co., of London, announce that \$20,000 of the second mortgage A and B 6 per cent. subsidy bonds, drawn for redemption at par with accrued interest on June 30, are payable at the company's office at the rate of \$1,302.50 per bond. (April 14, p. 274.)

**NORTHERN ALABAMA.**—Following the acquisition of this property by the Southern Ry., notice is given by the Southern that coupons due July 1 from prior lien bonds and general lien bonds, will be paid by J. P. Morgan & Co., New York. (May 5, p. 325.)

**PITTSBURGH & WESTERN.**—J. P. Morgan & Co., New York, give notice to holders of first mortgage 4 per cent. gold bonds, deposited under their notice of Dec. 14, 1898, that the coupons due July 1 of \$20 per bond, will be paid upon presentation at the office. (Dec. 23, 1898, p. 925.)

**SEBASTICOOK & MOOSEHEAD.**—Judge Savage at Augusta, Me., on June 24 appointed A. B. Thompson, of Pittsfield, Me., a Director, as Receiver. (May 26, p. 380.)

**WISCONSIN CENTRAL.**—Stockholders of the Milwaukee & Lake Winnebago, and the Chicago, Wisconsin & Minnesota will vote at Milwaukee on July 8 to ratify the sale of the properties, subject to other existing mortgages, to the W. C. The W. C., as already noted, is to be sold at Eau Claire, Wis., July 7, and the stockholders will meet July 12 to ratify the sale of the property to the reorganized company. (June 30, p. 484.)

## TRAFFIC.

### Traffic Notes.

The Texas Court of Criminal Appeals has decided that the anti ticket scalping law of that State is unconstitutional. The court seems to have held that a ticket is ordinary property; and it is declared that the Legislature, in passing this law, was going beyond its legitimate powers; the law is not a legitimate police regulation.

The Southern Pacific Company has sent to the State Railroad Commissioners of California a protest against the reduced tariff on grain which the Commissioners recently issued, declaring that the rates already in force are not unreasonably high.

This protest would seem to disprove the claims of certain California newspapers that the Commissioners, in readjusting the rates on grain, had taken special care to conform to the wishes of the officers of the Southern Pacific.

The State Railroad Commissioners of Kentucky have suspended the long and short haul law of that State. From the press despatch reporting this decision it would appear that it has been made in consequence of the disturbance of the coal traffic from Kentucky mines to Louisville by recent prosecutions of the Louisville & Nashville Railroad for violating the law. Coal was carried to Louisville at much lower rates than to intermediate towns, in order to compete with sellers of coal which was brought to Louisville by boats sailing down the Ohio River, but the road was complained of and fines were imposed.

Railroads west of the Missouri River have adopted a revised agreement concerning the rates of commission to be paid to foreign agents on sales of tickets westbound, under which, it is said, the rates will be considerably increased.

The State Railroad Commissioners of Louisiana have ordered a reduction in freight rates on rice to New Orleans from the principal rice-producing districts in that State. It is said that some of the reductions amount to 25 per cent. from the present tariff.

At Cincinnati, June 29, injunctions were secured from the United States and the State courts against all ticket brokers of that city, forbidding them to deal in excursion tickets issued for the Saengerfest. Similar action has been taken by the railroads at Detroit to protect the tickets issued to that city for the Christian Endeavor convention.

The newspapers report that the New York Central and the Lake Shore, on their through trains between New York and Chicago, which were recently made faster, continued to sell tickets at the old rate; that the Pennsylvania complained, and that on the westbound trains the fare has now been raised to conform to the shortening of the time.

The presidents of the trunk lines and their Western connections held a largely attended meeting in New York City, on June 28, at which the passenger and freight rate situations were discussed at length. It was decided that the question of differential fares between New York and Chicago should be referred to three arbitrators, who are to report whether or not any changes are desirable in the present rates. The arbitrators are: J. F. Goddard, F. C. Donald and a third person to be selected by these two. No decision appears to have been reached on any other question, and another conference was appointed to be held in Chicago this week.

### Chicago Traffic Matters.

Chicago, July 5, 1899.  
Chicago officers of the eastbound roads, particularly those of the standard lines, are elated over the action of the presidents in agreeing to have the question of differential passenger fares between Chicago and the eastern territory re-arbitrated. The standard line people look upon the action as a practical victory, on the ground that the executive officers of all the roads have come to the opinion that the old differentials do not provide a satisfactory equalization of rates now. A few of the local officers of the differential lines are opposed to any re-arbitration. There are others who take the ground that any arbitration of this question would be nothing more or less than an agreement on rates, which the Supreme Court has ruled in the Joint Traffic case is a violation of the Sherman anti-trust and the interstate commerce laws. But the presidents undoubtedly had this in mind, and the arbitrators probably will be instructed to investigate the entire differential question and put their ruling in the shape of a recommendation, which the roads will independently accept.

Chicago jobbers are in a sweat over the low rates that are in effect from New York and the East to southwestern Missouri River points via the Mallory steamship lines and the Kansas City, Pittsburgh & Gulf road. They held a conference with the officers of the Western roads in this city, and asked that the roads from Chicago to the competitive Southwestern territory do something to meet the Gulf rate. After the meeting representatives of the merchants said nothing would be done until after a meeting of railroad officers in New York this week.

Competition for soldier business has caused the Union Pacific to withdraw from the Western Passenger Association; that is, withdraw from the very limited and conditional membership which it has just taken in the organization. Mr. Lomax charges the Rock Island with unfairly capturing the movement of the 19th regulars from Chicago to San Francisco. The soldiers came from Camp Meade, Pa., and were contracted for by the Pennsylvania road.

Nearly 90 new trains have been added to the suburban service of the Chicago & Northwestern road on its three lines out of Chicago. The increased service is the result of the completion of track elevation.

Eastbound shipments of flour, grain and provisions from Chicago and Chicago junctions to and beyond the western termini of the trunk lines for the five weeks ending July 1 amounted to 368,098 tons, as compared with 292,486 tons for the corresponding period of last year. This statement includes 33,016 tons of flour, 249,183 tons of grain and 85,899 tons of provisions. The following table shows the quantities and proportions carried by the respective roads:

	P. c.
Baltimore & Ohio	41.888
Cleveland, Cincinnati, Chicago & St. Louis	44.022
Chicago & Erie	46.192
Grand Trunk	19.700
Lake Shore & Michigan Southern	75.045
Michigan Central	39.177
New York, Chicago & St. Louis	31.445
Pittsburgh, Cincinnati, Chicago & St. Louis	17.353
Pittsburgh, Ft. Wayne & Chicago	27.125
Wabash	24.541
	368,098
	100.0

Eastbound shipments from Chicago, as reported weekly by the Board of Trade, were, for the five weeks ending July 1, 379,410 tons, as compared with 354,869 tons for the corresponding period of last year. This total of 379,410 tons is made up of 60,105 tons of flour and mill stuffs, 193,025 tons of grain, 70,555 tons of provisions, 49,379 tons of dressed beef and 56,350 tons of miscellaneous freight.